Railway Age

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Grade Revision by the Development of an Alternate Route

THE reconstruction of a line in heavy country for the purpose of effecting a pronounced reduction in grades is expensive, not only because of the cost of the new work done, but also on account of the value of the old property that must be retired. When the existing line is a highly developed one serving prosperous communities and important industries, the problem is complicated by the high cost of additional right-of-way made necessary by the change and the expense incurred by the industries as a consequence of the change in the line or grade of the railroad which serves them. In some cases the physical changes required for the desired reduction in grade are so drastic that the expense becomes prohibitive and the situation is comparable to that of a line in a large city where the only practical means of increasing capacity or reducing the cost of operation is to build a belt line to serve as a diverting route. The equivalent of this solution of a grade reduction problem on a heavy-traffic engine district was adopted by the Pennsylvania with respect to that portion of its Fort Wayne line between Canton, Ohio, and Rochester, Pa., as described elsewhere in this issue. The Pennsylvania's project was made possible only because of the existence of a favorably situated alternate line which could be incorporated with 15 miles of new line to provide a new 70-mile route of much more favorable grades than those prevailing on the existing main line. While situations offering an equally favorable solution of a grade revision problem will not be encountered frequently, there are lines in many parts of the country where comparable opportunities are afforded for grade revision work and it is through the prudent development of such opportunities that the railroads have made the greatest improvement in their lines in recent years.

Public Relations Work and Rates

WE publish elsewhere portions of an interesting address that was delivered recently by John J. Cornwell, general counsel of the Baltimore & Ohio, who was formerly governor of West Virginia. It emphasizes the necessity for constant public relations work by the railways and describes the public relations organization of the Baltimore & Ohio, which extends into every community that the railroad serves. The address also alludes to the greatest danger to sound regulation with which the railways are threatened. The tendency of government regulation ever since it became effective has been to prevent the railways from prospering anywhere near as much as other industries when most industries were prosperous, and then to keep the net return earned by them far below a fair return when other industries were not prosperous upon the principle that the railways should not be allowed to prosper when other industries were suffering from adversity. The bituminous coal mining and agricultural industries enjoyed enormous prosperity during the war, in which the railways were not allowed to participate. Now that these industries are depressed there is a tendency to hold down or actually reduce freight rates charged upon their products. This tendency is best illustrated by the passage of the Hoch-Smith resolution by Congress and by the decision of the Interstate Commerce Commission in the recent western rate case. Most of the industries of the country are now prosperous, and the railways are handling a record freight business, but the railways as a whole are not even now earning a fair return. In spite of this the railway earnings being made in eastern and southern territory are beginning to be used as arguments for reductions in rates, while in western territory, where the return being earned is wholly inadequate, advances in rates are not allowed. All this is plainly contrary to the policy of the Transportation Act, the assurances of which regarding a fair return have enabled the railways within recent years to raise and invest billions of capital from which the nation is deriving enormous economic benefits through improved transportation service. Experience has clearly demonstrated that the commission cannot be relied upon to regulate rates fairly unless public sentiment favors it and emphasizes the necessity for the railways not only to give the public the best service possible, but also to spare no effort to convince it that, in the long run, the service rendered must and will depend upon the rates the railways are allowed to charge and the net returns they are allowed to earn.

The Train Control Situation Is Being Ironed Out

ALTHOUGH train control was a thorn in the side of railroad officers for some time following the order of the Interstate Commerce Commission in June, 1922, it is now accepted by the majority of the carriers involved, as well as by the commission, as a "long haul" proposition in which hurried decisions have given way to conservative progress. The completion date of the installations under the first order was set as January 1, 1925, but the decision of the United States Court at New York on May 26, 1925, in the Delaware & Hudson case in effect set July 18, 1926, as the completion date for the first order. However, since this decision and for good and sufficient reasons, the commission has granted requests of the carriers for extensions of time wherever diligent efforts were evident, and a few roads have been excused from complying with the order. In almost all cases the equipment selected in compliance with the second order of January, 1924, is a duplication of that installed to comply with the first order and, therefore, the discussion of the situation may be confined at present to the installations required under the first order of June 13,

1922, on which about 90 per cent of the apparatus is now in place. Installations required under the first order include about 3,760 locomotives and 7,860 miles of track. Of these totals 83 per cent of the locomotives and 77 per cent of the track are operated under the automatic train stop system which does not incorporate the speed control feature in an occupied or caution block, while 17 per cent of the locomotives and 23 per cent of the track are equipped for train control, including speed control. Further, of these installations, 62.7 per cent of the locomotives and 57.2 per cent of the track are equipped with intermittent devices while 37.3 per cent of the locomotives and 42.8 per cent of the track are equipped with continuous control. These percentages give a more accurate index of the type of apparatus involved than is shown by the number of roads using each type. However, it is noteworthy that all different types are being used, on both single track and multiple track and on lines with comparatively light and with heavy traffic. Therefore, within a few years, records will be available to show which system is best fitted to meet certain conditions and whether or not the permissive feature with the train stop can be used with safety. Likewise performance and maintenance records and installation costs can be compared in detail. In other words, the stage is all set for an extensive test and development of automatic train control during the next four or five years. It would seem that nothing further can be gained by additional orders for train control during this period.

The Shifting Sands of Regulation

THE decision of the Interstate Commerce Commission in the western rate advance case should cause railway executive officers to give serious and profound consideration, both individually and in conferences, to the question of where present tendencies of regulation are adapted to land the railways. This question is of greater importance to each railroad than any that arises in the current management of individual properties.

The eastern and southern lines are now the most prosperous they have been since government control. Even the decision in the western rate case holds out hope of some relief for the western lines for the commission recognizes that rates in western trunk line territory are too low, compared with those elsewhere in the west. But this does not afford much encouragement. The commission warns the carriers not to propose advances in rates on farm products that are "depressed." Now it happens that farm products constitute an especially large portion of the traffic in western trunk line territory, and therefore the commission's warning about freight rates on them is a particularly hard blow to carriers in the very territory in which, apparently, it holds out some hope of relief.

To all the railways of the country the most threatening feature of regulation by the commission is its steady abandonment, step by step, of almost every economic or legal principle upon which it has ever based decisions in rate cases, as soon as any principle it has once recognized becomes an argument against a reduction or in favor of an advance in rates. This renders it more and more difficult for counsel and witnesses for the railways to decide how to present cases to the commission and introduces ever increasing uncertainty into regulation. Nobody can safely predicate upon anything the commission has said or decided in the past an anticipation as to how it will decide any rate case in future, unless it be an anticipation that if it can find any plausible excuse for doing so, it will decide against the railways.

There is no consistency whatever in the fundamental premises from which it has reasoned in reaching its conclusions in important rate cases. The commission long urged Congress to pass a law for the physical valuation of railroads. In 1911, two years before the La-Follette valuation law was passed, it referred, in the opinion by Commissioner Prouty in the eastern rate advance case, to the fact that it had "several times urged Congress to take steps looking to such a valuation," and said, in reference to the elements that should be considered, "The next item named by the Supreme Court is the present cost of reproduction. *This is undoubtedly a factor of great importance in determining the value of the railroads of this country upon which earnings may be legitimately demanded.* The courts have repeatedly recognized this in their decisions touching the rates of public service corporations." Largely owing to the urging of the commission the valuation law was passed in 1913. Regarding the change in the cost of railroad construction between 1914 and 1925 the commission said in its recent opinion in the western rate case: "No one will question the fact that the percentage of increase is large, certainly in excess of 50 per cent," exclusive of working capital and land. And yet in spite of what the commission said by Commissioner Prouty in 1911 its Bureau of Valuation has been proceeding upon the assumption and is now contending that virtually no consideration should be given in valuation to the cost of reproduction.

In its decision in the western rate case, the commission did something much more extreme than merely to ignore cost of reproduction as a factor in valuation. The railways contended that the property investment shown by their books was nearer to a fair valuation than the commision's tentative valuation, and therefore should be used as a basis. The commission said: "We shall not attempt in this case to enter into this matter nor to substitute a new basis of valuation for that heretofore recognized, because it is not necessary to do so in view of our conclusions." In other words, before it got the valuation law passed it took the position that a valuation based largely on cost of reproduction was necessary to enable it satisfactorily to determine reasonable schedules of rates. Now that the valuation law had been in effect and it had been assembling information under it for 13 years, the commission, according to its own statement, arrived at its conclusions in an important case for a general advance in rates regardless of valuation.

Nobody knows how large a valuation which should give adequate weight to cost of reproduction would be, but it is plain it would be larger than the property investment account of the western lines which now exceeds $10,000,000,000. The commission, however, not only did not take into consideration the probable cost of reproduction, but equally disregarded the property investment account. The commission's own tentative valuation of the western lines, increased to include the investment made in them since 1920, was, at the end of 1925, about $8,653,000,000. The commission even disregarded its own tentative valuation. The net operating income of the western lines in 1925 was equivalent to a "fair return" of 5¾ per cent on only about $7,150,000,000. Thus, having in past years held that the cost of reproduction is perhaps the most important feature in valuation; having subsequently, under the Transportation Act, definitely made a tentative valuation of the western

lines and held they were entitled to earn a return of 5¾ per cent on it, and then failed to so fix rates as to enable the railways to earn this, the commission now renders a decision denying a general advance in rates, the effect of which is to leave the railways with rates which will produce a "fair return" upon a valuation about $1,500,000,000 smaller than its own tentative valuation, about $3,000,000,000 less than the property investment and by a still greater amount less than would be a valuation that took account of cost of reproduction.

A careful examination of the opinion seems to disclose three excuses the commission offers for not granting an advance in rates. The first is the "depression" in certain products of agriculture. Presumably this is meant to be an application of the principle of basing rates upon what the shipper can afford to pay, which apparently is the principle of the Hoch-Smith resolution. When we turn back to the opinion rendered by the commission in the western rate advance case in 1911 we find the following language: "To make rates for transportation based solely upon the ability of the shipper to pay those rates is to make the charge for transportation depend upon the cost of production rather than upon the cost of carriage.* * * This theory entitles the railways to enter the books of every enterprise which it serves and raise or lower rates without respect to its own earnings but solely with respect to the earnings of those whose traffic it carries." The commission then emphatically repudiated this method of rate making, whether as one to be followed by the railways or a government regulating body. The stone which the builders then rejected apparently is now becoming the headstone of the corner. The commission would not then look at the books of business concerns or farmers to find out what they could afford to pay. It would look only at the books of the railways to determine the cost of rendering transportation service. Now it disregards what the books of the railways show, but carefully scrutinizes the books of the farmers and bases its regulation upon what it concludes they can afford to pay.

Another excuse given by the commission for its decision is that the existing adjustment of rates between different parts of western territory is faulty. The relationship between the rates in different parts of western territory was practically the same in 1922 as now, and yet the commission did not then find it an insurmountable obstacle, to a horizontal reduction of rates about three times as great as the horizontal advance which it now rejects.

"It is clear upon the record," says the commission, "that there are many inequalities in the rate structure existing in parts of the western district which should be corrected. The provision in Section 15-a directing us to initiate, modify, establish or adjust rates so that carriers may earn a fair return does not relieve carriers from the duty of initiating rates. That function belongs to management and not to regulation." What, then, does the word "initiate" in the law mean? Why was it put in? The intent of Congress must have been that the commission should co-operate with the carriers in initiating changes necessary to give effect to the rate-making provisions. Apparently the commission means that it will not give such co-operation. There may be many ways that occur to the carriers in which rates might be readjusted, but only one way in which the commission would allow it to be done. Does the commission mean the carriers must simply guess as to the way the commission would approve, and that if they guess wrong nine times out of ten they must institute proceedings ten times in order finally to hit upon the correct method?

The commission's policy of regulation of rates since 1920, culminating in its decision in the western rate case, constitutes not only an abandonment of principles it had previously enunciated, but a nullification of laws it is charged with administering. The LaFollette valuation law requires it to consider cost of reproduction in valuation, but it has thus far failed to give it any substantial consideration. The rate-making provisions of the Transportation Act require it to initiate, modify and adjust rates so as to enable the railways to earn a fair return upon a fair valuation, but these provisions apparently have had no real influence on its policy except to cause it to try to recapture earnings from roads suspected of earning more than six per cent.

Senator LaFollette and other western radicals are advocating repeal of the rate-making provisions upon the ground that this would result in reductions of rates. Apparently they are not familiar with the policy of the commission. The nullification of a law may be as effective as its repeal. The main thing that has yet been done with the rate-making provisions is to quote them. The commission solemnly quotes them, and then disregards all but the recapture part of them. Therefore they do the railroads no good. Demagogues quote and denounce them, advocate their repeal and thereby stir up public sentiment against the railways and get votes. On the basis of experience during the last five years it is the railways that should be advocating their repeal. The commission could hardly regulate rates with more disregard for the right of the railways to earn a fair return than it has during the last five years if they did not exist, but their repeal would deprive the demagogues of a very valuable talking point.

Fruit and Vegetable Shipments To Be Large

WILL the railroads this year be able satisfactorily to handle the fresh fruit and vegetable shipments, which reach a peak during the months of August, September and October? They will be greater than in any previous year. Because of the size of the movement the task will be difficult, and only through the co-operation of everyone concerned with it can it be accomplished satisfactorily. This co-operation will be most needed in the prompt releasing of cars by consignees, for the supply of cars will prove inadequate unless each car is kept moving as much and rapidly as practicable.

That the handling of the fruit and vegetable traffic presents a problem of increasing difficulty each year because traffic of this kind is growing so fast is shown by the accompanying table, which gives the increase in carloadings since 1917, and compares for years since 1919 the increase in carloadings with the increase in the number of refrigerator cars, exclusive of those owned by the meat packers. Satisfactory statistics regarding refrigerator cars for years before 1919 are not available.

Year	Carloads, fruits and vegetables	Per cent	Refrigerator cars owned exclusive of packers' cars	Per cent
1917	412,178	69	.....	....
1918	495,576	84	.....	....
1919	591,003	100	90,383	100.0
1920	663,447	112	90,978	100.7
1921	751,699	125	95,100	105.0
1922	854,081	144	104,276	115.0
1923	878,502	148	121,964	134.0
1924	923,549	156	132,585	146.0
1925	963,442	163	133,485	147.0

It will be seen that since 1919 the carloadings of fruits and vegetables have increased at almost 1.2 the rate at which the cars owned have increased. In 1925 the carloadings were 1.63 times greater than they were in 1919,

while in 1925 the number of cars owned was only 1.47 times greater than in 1919. The average increase in carloadings each year has been 10.5 per cent, while that of cars owned has been only 7.8 per cent.

Some conception of the task presented this year can be obtained from the estimated volume of shipments. The need for co-operation can also be realized. The grape movement this year from the Pacific Coast alone, practically all of which occurs during the months of September and October, will require from 85,000 to 90,000 refrigerator cars. It is estimated that all commodity movements from California will be 10 per cent greater than last year. From Colorado the perishable fruit and vegetable shipments will be 5 per cent greater than in the previous year, totaling 34,868 carloads. One railroad estimates its shipments of fruits and vegetables from the Yakima Valley in Washington at 24,775 and 7,400 cars respectively, which is an increase of almost 10 per cent. Both New York and Michigan will have an increase in shipments over those of last year, the grape shipments from the latter state being estimated at 4,000 cars, as compared with 366 cars last year.

The successful handling of last year's movement was due to the effective co-operation of the carriers, shippers and consignees in handling the traffic. Under the arrangements between the carriers a road short of refrigerator cars sent its appeal for help to the Car Service division of the American Railway Association, which broadcast it to all other carriers, who in turn co-operated in removing the shortage. Efforts were also made to avoid emergencies by getting advance estimates of actual production in the various territories and distributing cars as far as possible according to the information thus obtained.

In addition, "perishable" committees were organized at the principal terminals under the various Regional Shippers Advisory boards to prevent the undue detention of cars. These terminal committees, consisting of the receivers of freight and railroad agents, obtained daily reports of delayed cars from each railroad agent in the various cities and applied every legitimate form of pressure on consignees who were holding cars. As a result of this effort on the part of the terminal committees in 1925, 72 per cent of the refrigerator cars were released in free time as compared with 68 per cent in 1924, and 61 per cent in 1923. It is estimated that if 85 per cent of all the refrigerator cars are released within the free time period this year the movement will be handled without a car shortage.

It is evident that if this is to be done the unloading of cars by consignees within recent weeks will have to be greatly improved. In the week ended July 9 in the country as a whole, only 67 per cent of refrigerator cars were released within "free time," which is a period of 48 hours after a car is set for unloading, during which no demurrage is charged on it. There are wide differences in the promptness with which cars are unloaded in the various regional shippers' advisory board districts, as is shown by the following figures regarding the percentages of cars released within "free time" in the week ended July 9 in the various regional board districts, of which the cities mentioned are the headquarters: San Francisco, 82; New York, 80; Cincinnati, 71; Minneapolis, 69; Seattle, 69; St. Louis, 65; Boston, 64; Dallas, 64; Omaha, 64; Chicago, 62; Birmingham, 56; Washington, 51; Detroit, 48, and Pittsburgh, 31.

One of the greatest problems of the railroads and one which will require special attention is the handling of equipment so as to insure its return to the producing territory in sufficient volume during the period of peak production to meet the demand for cars. The successful handling of this year's movement necessitated the closest conformity to the following rules: (1) Place cars promptly for unloading, (2) move them promptly from team tracks when released from loading, (3) place them promptly in road trains and do not leave them standing in yards and terminals, and (4) utilize time freight service. If those concerned with this year's movement will co-operate along these lines the traffic can be handled as successfully as it was last year.

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

Commerce Year Book 1925, compiled by U. S. Bureau of Foreign and Domestic Commerce. Fourth issue of this year book. The section, "Transportation and Communication," p. 508-549, is reprinted as Trade Information Bulletin No. 425. 10 cents. 752 p. Pub. by Govt. Print. Off., Washington, D. C. $1.

The Flow of Water Through Culverts, by David L. Yarnell, Floyd A. Nagler and Sherman M. Woodward. Results of experiments. Univ. of Iowa. Studies in Engineering, Bulletin No. 1. 128 p. 33 plates. Pub. by University of Iowa, Iowa City, Iowa. $1.

Health Control in Mercantile Life: A Problem of Conserving Human Energy, by Dr. Arthur B. Emmons, ed. 234 p. Pub. by Harper & Bros., New York. $3.

Periodical Articles

The Chinese Eastern Railway, by D. C. C. Wang. A history emphasizing diplomatic and financial relations of this line. Far Eastern Review, June, 1926, p. 257-262.

Detecting Rail Flaws by Magnetism. An illustrated article on the magnetic defectoscope developed in the laboratories of the Japanese Government Railways. Literary Digest, July 24, 1926, p. 20, 21.

Down the Years With Loss and Damage, by Joe Marshall. The inception of the campaign of prevention by the Freight Claim Association with an analysis of the results especially from 1920-1925. Packing and Shipping, June, 1926, p. 24-26.

"If I Were a Dictator," by Senator David A. Reed. "If I were a dictator I would abolish the Federal Trade Commission this morning, the Shipping Board tonight and the Interstate Commerce Commission tomorrow." p. 16. Nation's Business, August, 1926, p. 16-18.

Thirty Years Without a Loss or Damage Claim. Description of the packing and marking methods used to accomplish this record by the Goodell-Pratt Co., of Greenfield, Mass., tool manufacturers. Packing and Shipping, June, 1926, p. 33-35.

Use of the Microscope in Industry, by R. G. Guthrie. Particularly on steel, one illustration showing a piece of steel magnified 15,500 diameters. Journal of the Western Society of Engineers, Technical Papers, June, 1926, p. 215-225.

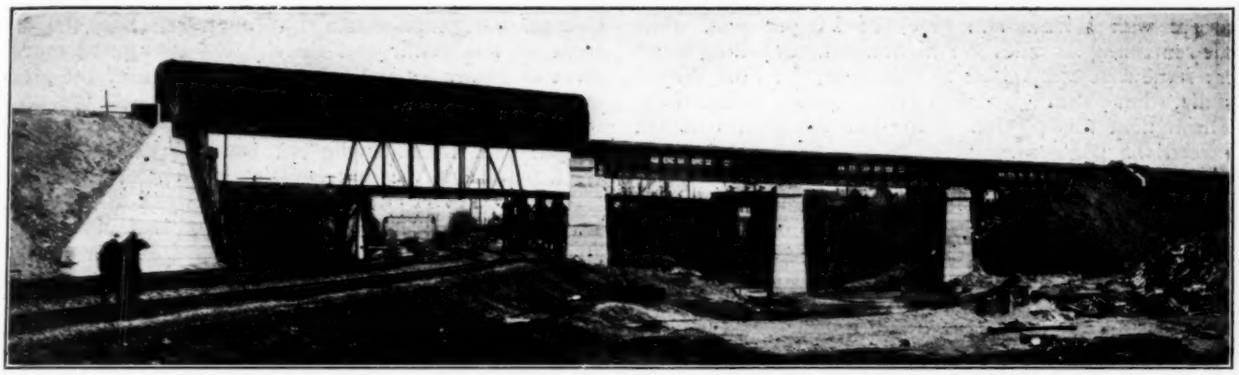
Valuing Railroads—Need for a Supreme Court Determination of Policy. The status of valuation at present, and what has to be done before progress can be made. Index (New York Trust Co.), July, 1926, p. 3-5.

Can Transportation Costs Be Cut? by John A. Piquet. Discusses wastes through lack of co-ordination and their elimination, relocation of industries, and improved methods. Industrial Management, July, 1926, p. 46-51.

Southern Pacific—A Western Giant, by J. A. Pollock, Jr. Brief history and present system. Magazine of Wall Street, July 17, 1926, p. 528-529, 611-612.

Train Robbing—As a Business, by Boyden Sparkes. Contrasts methods and results of Jesse James and his associates with card sharks traveling in Pullmans today. Shrine Magazine, July, 1926, p. 54-55.

Teeftallow, by T. S. Stribling. "Railroad Jones" appears in this novel on page 5 and proceeds to play an important part in the proceedings. Railroaders may—or may not—like "Railroad Jones." 405 p. Pub. by Doubleday, Page & Co., Garden City, N. Y. $2.

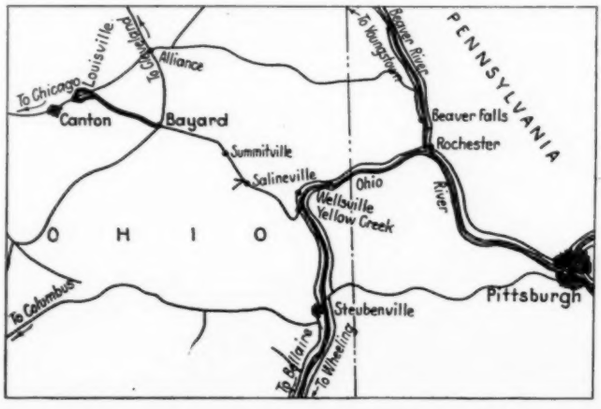


The Jump-Over at Louisville, the Four-Track Fort Wayne Line at the Left

Pennsylvania Completes 15-Mile Cut-off in Eastern Ohio

Short piece of new line develops low grade route between Pittsburgh, Pa., and Canton, Ohio

BY the construction of a 15-mile double track cut-off between Louisville, Ohio, and Bayard, at a cost of about $4,500,000, the Pennsylvania has developed a 70-mile alternate route for that portion of the Pittsburgh-Chicago (Fort Wayne) line between Rochester, Pa., and Canton, Ohio, which is not only



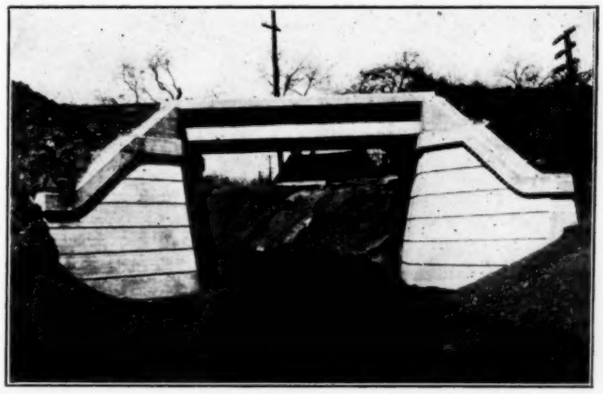
How the Canton-Bayard Cut-Off Develops a New Route Between Canton, Ohio, and Rochester, Pa.

1 1-2 miles shorter than the old main line through Alliance, Ohio, and Beaver Falls, Pa., but affords much more favorable grades. In addition to the 15 miles of new line, the new route embraces 55 miles of the Cleveland & Pittsburgh railroad, a merged property of the Pennsylvania which crosses the Fort Wayne line at Alliance, Ohio, and extends southeast to the north bank of the Ohio river which it follows in a northeasterly direction to a junction with the Fort Wayne line at Rochester.

The primary consideration prompting the development of the new low-grade route was the unfavorable grades on the old line which occupies a location lying almost entirely transverse to the drainage of a heavy rolling country with the result that it has a choppy grade line with a ruling grade of one per cent in both directions. This main stem of the Pennsylvania is a highly developed heavy-traffic line with a considerable mileage of four main tracks. Its reconstruction for the purpose of obtaining more favorable grades would entail an enormous expenditure. Furthermore, it would also involve diversions from the present location through highly developed industrial communities now established along this route. For these reasons it was deemed inadvisable to undertake grade reduction on this portion of the Fort Wayne line at this time.

Conditions Favoring the New Route

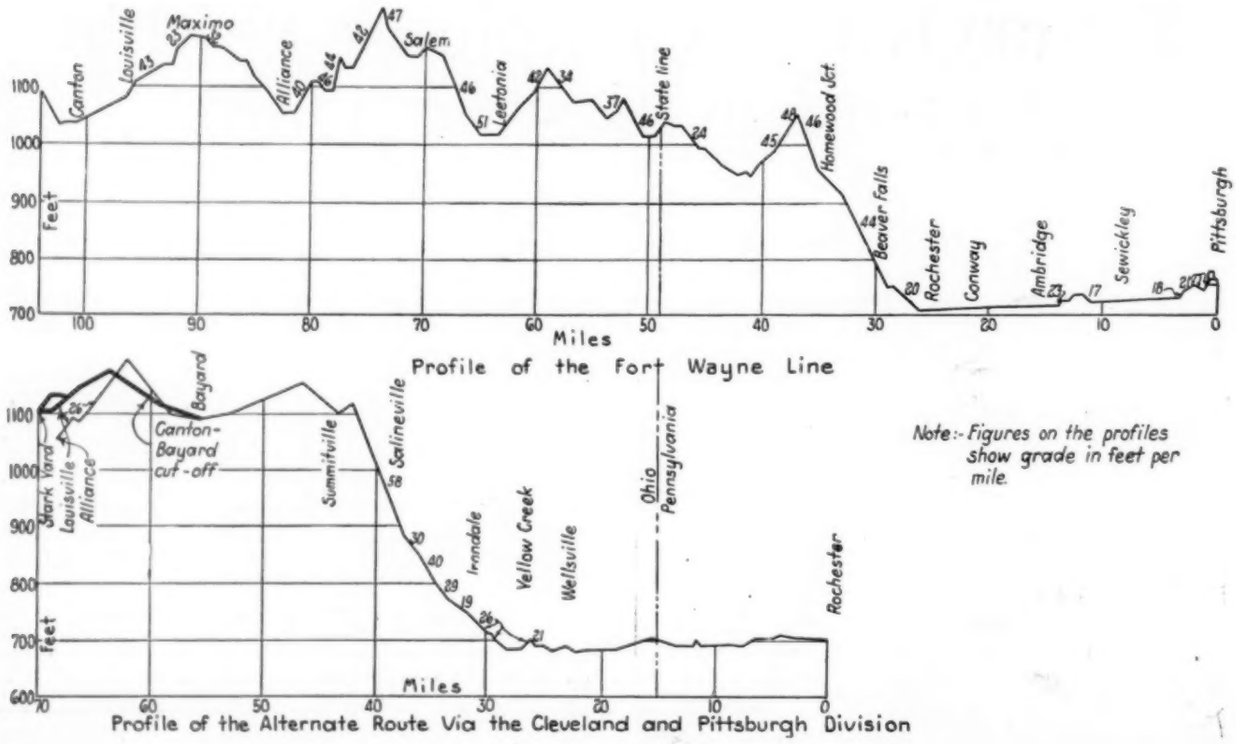
The favorable characteristics of the Cleveland & Pittsburgh line between Alliance and Rochester for the development of an alternate route becomes apparent upon a comparison of the profiles of the two routes. For the 26 miles from Rochester to Yellow Creek this line is on a water grade along the north bank of the Ohio river. The next 16 miles to Summitville comprises a continuous



Special Pains Were Taken to Obtain Strong and Well Appearing Concrete

ascent with a maximum grade of 1.0 per cent, while the remaining 23 miles to Alliance occupies rolling country somewhat comparable to that along the Fort Wayne route, but with far less pronounced undulations. Throughout this portion of the line the grades do not exceed 0.5 per cent.

This line has been used primarily for freight service between Cleveland and Pittsburgh and also as a connection with the Wheeling division of the Pennsylvania to Bellaire, Ohio, and Wheeling, W. Va. It is also used by six passenger trains between Cleveland and Pittsburgh. It has not, however, been used to any extent as an alternate route between Pittsburgh and the West primarily because the crossing of the two lines in Alliance is in a congested location and makes movement from one line to the other impracticable. It is also nine miles longer than the Fort Wayne line. But, by



Profiles of the Fort Wayne Route and the New Route Compared

the construction of the double track connection from Louisville on the Fort Wayne line to Bayard on the Cleveland and Pittsburgh line, it has been possible to develop a shorter route and one which also eliminates 10 miles of 0.5 per cent. grade on the Cleveland and Pittsburgh line immediately southeast of Alliance.

This cut-off has been constructed to 0.3 per cent. grades while that portion of the Cleveland and Pittsburgh line embraced in the new route has no grades in excess of 0.3 per cent. except for the ascent for westbound trains from the Ohio river to Summitville. As it is planned to continue helper service which is now being maintained on this grade, the Pennsylvania is afforded the equivalent of a 0.3 per cent. line for the entire engine district between Pittsburgh and Canton.

How the New Route Will Be Used

It is planned to use the new route primarily for slow moving freight trains, thereby obtaining the advantage of better grades for tonnage trains as well as the incidental advantage obtained through relieving the old route of this traffic and thereby expediting the movement of passenger and fast freight trains over the present main line.

The two main tracks of the cut-off leave the Ft. Wayne line at Louisville but both tracks are carried west, parallel to the four-track main line, for a distance of two miles to F. O. Tower at the east end of the Stark yard which is located a short distance east of Canton. In order to avoid a grade crossing of the westbound track of the cut-off with the four tracks of the main line, this track crosses over the latter on a jump-over at Louisville with a descending grade of 1 per cent. from the jump-over bridge to the level of the main tracks.

East of Louisville the line occupies moderately rolling country in which a continuous ascending grade of 0.3 per cent., compensated, could be obtained with fairly light work to a point about 3 1-2 miles east of the junction. At this point the character of the country changes abruptly and for the remaining distance to Bayard the line is in a heavy rolling territory in which changes of elevation of as much as 140 ft. occur within a distance of 1-2 mile. The direction of the water courses is such that no advantage could be taken of them in developing the location of the line. In fact, they are ignored entirely. The location is direct and does not deviate more than 3-4 mile from an air line connecting the two terminals. The total central angle for the eastbound track is 205 deg. 30 min. while that for the westbound track, on account of the greater curvature in the jump-over, is 222 deg. 51 min. The grade line of the location comprises a continuous ascent from elevation 1,101.50 at F. O. Tower to elevation 1,175.98 at about the mid point of the line followed by a continuous descent to Bayard at elevation 1,078.0. Rise and fall on the eastbound track totals 74.48 ft., while an adverse

westbound grade approaching the jump-over in the westbound track increases the rise and fall for that track to 83.57 ft.

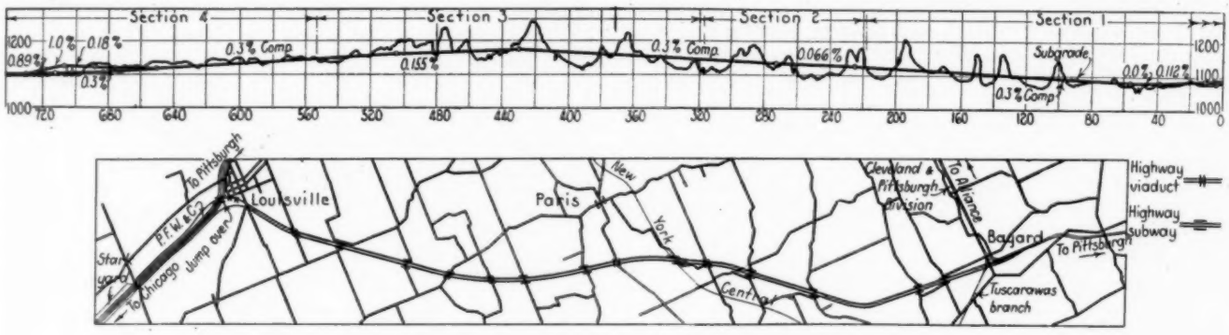
Line Cuts Through Part of Louisville

The line is entirely in open country except at the junction with the Ft. Wayne line at Louisville where it cuts through a corner of the town, a situation which could not be avoided because the presence of a large industrial plant between Louisville and Stark yard precluded a location of the junction further west without bringing it too close to the end of the yard. This resulted in the introduction of considerable additional curvature which could have been avoided except for this fact, and entailed the use of a 4-deg. curve on the eastbound track and a 3-deg. curve in the westbound track, whereas all other curves on the line are limited to 2 deg.

The grading on this project amounted to 2,300,000 cu. yd. in excavation, of which it was necessary to waste about 420,000 cu. yd. All of this waste was in the west half of the line where the volume of material in cuts exceeded that in embarkments. On the east half of the line it was possible to balance the cut and fill quantities. The change in the character of the country about 3 1-2 miles east of Louisville is coincident with a change in the nature of the material encountered in the cuts. West of this point it is a sandy yellow clay with a small amount of blue gumbo in the bottoms of a few of the cuts. The yellow clay is easy to handle in dry weather but becomes soft during wet weather and during periods of continued rainfall caused considerable difficulty because the flat grade of the line did not afford adequate drainage during the construction operations.

Special Conditions Encountered

East of Station 503 there is only a small amount of the yellow clay overlying the blue gumbo under which blue shale was encountered. Further east, there were underlying strata of hard and soft sandstone together with light seams of coal. In two cuts there was a stratum of coal close to the grade line with fire clay underneath and to avoid a soft bottom in the cuts this fire clay was taken out two feet below sub-grade and replaced by a blanket of granulated slag. However, greater trouble was caused by the blue gumbo which proved unstable in some of the cuts and produced large slides as shown in one of the photographs.



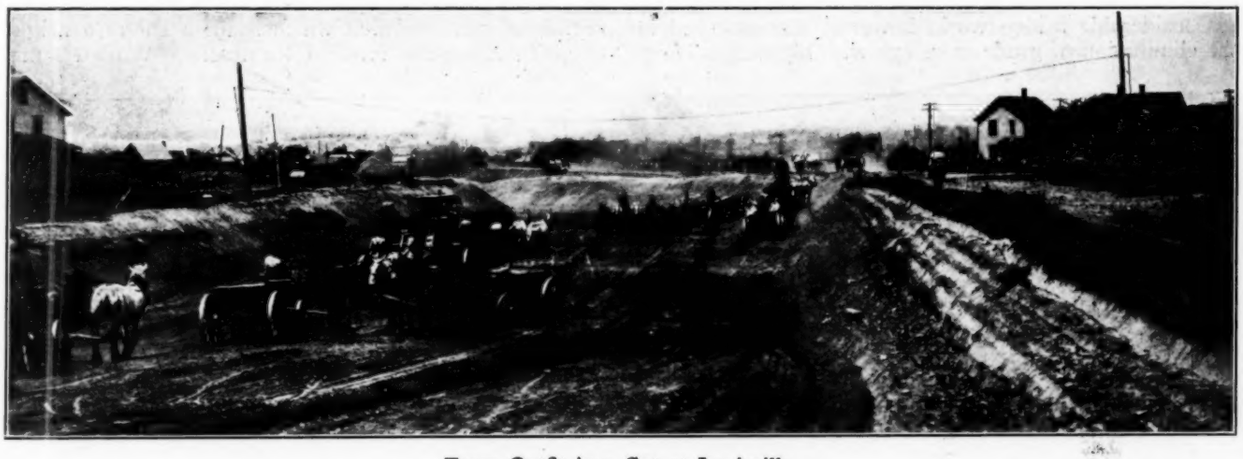
Map and Profile of the Canton-Bayard Cut-Off

For construction purposes the line was divided into four sections ranging from two to four and one-half miles in length. The grading on Section 1 at the east end of the line was awarded to A. Guthrie & Co., St. Paul, Minn., Section 2 and 4 to the Ferguson-Edmundson Company of Pittsburgh, and Section 3 to the John F. Casey Company of Pittsburgh.

How the Grading Was Done

Section 4, which covered nearly four miles at the west end of the line, consisted largely of shallow cuts, one of which was about two miles long with a maximum depth of 10 ft. and contained 199,600 cu. yd. About 60 per cent. of the grading on this section was done with teams and excavating graders. The construction of the jump-over line for the westbound track involved an embankment 3,900 ft. long containing 87,000 cu. yd. The steam shovel work on this section was handled with standard-gage cars.

In the other three construction units the cuts are



Team Outfit in a Cut at Louisville

much deeper and with more frequent breaks from cuts to fills, although in Section 3 there is one stretch of 6,100 ft. of almost continuous cut embracing a total of 453,000 cu. yd. The deepest cut has a depth of 100 ft. (from grade to top of slopes) and required the excavation of 375,300 cu. yd. in a length of 2,500 ft. There were five other cuts with yardages in excess of 100,000 cu. yd. each and three fills ranging from 294,000 to 343,000 cu. yd. in volume, the longest having a length of 4,300 ft.

Only a relatively small proportion of the grading on Sections 1, 2 and 3 was handled with teams. This team work, totalling 185,000 cu. yd., was employed primarily for building the embankment approaches to highway over-crossings and low fills on the line where it served to avoid the construction of filling trestles. Most of the material handled by teams and trucks was excavated by small steam shovels rather than excavating graders. The rail haul was all in 4-yd. 3-ft. gage cars, and as many as 17 steam shovels, 30 narrow gage locomotives and 237 cars were employed at one time. The steam shovels were of various types and sizes, the largest being a 125 Marion shovel on caterpillar treads with a long boom used on Section 1. With this machine it was possible to take out a cut wide enough to permit the placing of the loading track alongside the shovel, the reach of the shovel being great enough to permit the loading of five cars at one setting on the stub track.

Bridge Work Primarily for Grade Separation

One distinctive feature of this line is the fact that it does not cross any waterways of importance. The largest bridge over any stream consists of three spans of 65-ft. deck girders adjacent to the 103-ft. through girder span which forms the crossing of the westbound track over the Fort Wayne line at Louisville. Besides this bridge there is one bridge of three 29-ft. reinforced concrete spans, one of two 26-ft. spans of the same type, a single 30-ft. arch and a single 40-ft. arch in addition to a considerable number of box culverts ranging in size from a single 3-ft. by 3-ft. to a double 12 1-2 ft. by 12-ft., and a number of concrete pipe culverts.

Considerable bridge work, however, was required in the elimination of grade crossings with highways. There are only two highway grade crossings on the line, both of them in Bayard, where the new line lies parallel and adjacent to the old line at existing highway crossings. Eight highways are carried over the tracks, while eight others cross under the line. All of the over-crossings are reinforced concrete structures except one in Louisville which is a pony truss span. The under-crossings are concrete slab or arch structures except four. Two of these are steel through girder spans, at locations where the headroom did not permit of the floor depth necessary for concrete slabs. One forms part of a four-span bridge over a branch line of the New York Central and an adjacent highway, and one is a 40-ft. deck girder span at a location where unsatisfactory foundations precluded the construction of a concrete arch.

Much of the Grading Was Heavy

The most interesting bridge on the line is a 120-ft. reinforced concrete arch which spans a cut at a height of 60-ft. above the level of the tracks. Work on this structure was started as soon as the excavation in the cut had been carried deep enough to provide room for the setting of the arch centers. As a result, the falsework for the arch centers was far less expensive than would have been the case if the work on this structure had been delayed until the cut was completely excavated.

A 120-ft. Highway Arch 60 ft. Above the Railroad

All of the concrete work was proportioned according to the Abrams method on the basis of 2,000-lb. con-

crete for all parts of the structure except arch rings and slabs under tracks which was designed to give a strength of 2,500 lb. at 28 days. In addition to effective field control of the concrete work, cylinders were made at regular intervals and sent to the laboratory of the engineer of tests for compression tests. Chuting of concrete was restricted in the specifications to a maximum horizontal distance of 50 ft. from the mixer. At one bridge a short distance from Bayard, the completion of which determined the rate of progress in track laying, the deck slab for one track was constructed with Lumnite cement so that trains could be run over the bridge 24 hours after the concrete had been placed.

The Roadbed

The tracks are spaced 14 ft. center to center. The roadbed on fills is 38 ft. wide and in cuts 34 ft. wide to the edges of the shoulders, while the side slopes of cuts are 42 ft. apart at roadbed level. All fills have 1 1-2 to 1 slopes. The same is true of cuts in earth. Cuts through rock have 1 to 1 slopes except in one cut

A Troublesome Slip in a Blue Gumbo Cut

of more stable rock where the slope was made ¾ to 1.

The tracks have been laid with 100-lb. relayer rail except for a short stretch at the west end which was laid with 130-lb. relayer rail. An interesting fact in this connection is that the 100-lb. rail used on this line is in 60-ft. lengths. The ties are all creosoted and fully tie plated.

All track work, including track laying, ballasting and surfacing, was done under contract by the Newhall Company of Cleveland, Ohio. The contractor used a locomotive crane for unloading and placing rails in the track. The ties were dragged forward from cars by teams while track fastenings were moved ahead on stone boats. Junctions with the old line at each end of the cut-off are protected by interlocking plants.

The location and construction of this line was carried out under the general direction of Robert Trimble, assistant chief engineer, Pennsylvania System, who has recently been appointed chief engineer of the Pennsylvania Company. The project was in direct charge of B. V. Sommerville, assistant to the chief engineer, Pennsylvania System, while D. L. Sommerville was engineer in immediate charge on the ground.

Application for New Southwestern System Filed

WASHINGTON, D. C.

APPLICATIONS for the approval and authorization of the Interstate Commerce Commission of a new southwestern railroad system of 5,801 miles were filed with the commission on July 24 by the Kansas City Southern, which asked authority to acquire control of the Missouri-Kansas-Texas, and by the M-K-T, which asked authority to acquire control of the St. Louis Southwestern, "by stock ownership, not involving a consolidation," in both cases.

The Kansas City Southern in its application stated that it had acquired 350,000 shares of the common stock of the M-K-T, and proposed to acquire additional shares to the amount of a majority, by purchase and/or exchange. It had paid for the shares $11,475,561 or at the rate of $32.80 a share, whereas the market price in the first 22 days of July had averaged $37.30 a share. The M-K-T application stated that it had entered into an agreement with the Kansas City Southern and the Central Union Trust Company on July 23 to purchase from the Kansas City Southern, subject to the commission's approval, 135,000 shares of the 5 per cent preferred stock of the St. Louis Southwestern and 20,000 shares of its common stock for $13,613,301, paying at present $7,000,000, with interest at 5 per cent on the balance, under provision for repayment of the $7,000,000 with interest at 5 per cent if the commission should not approve the purchase, the stock meanwhile to be deposited with the Central Union Trust Company. The board of directors had also authorized the officers of the company to acquire additional stock to the amount of a numerical majority, at prices to be determined by them, not exceeding current quotations on the New York Stock Exchange and in any event not above $92 a share for the preferred or $74 for the common.

The Kansas City Southern desires to control the Katy whether or not the latter is allowed to control the Cotton Belt. The application states that by reason of its ownership of the stock of the Katy and its former ownership of the Cotton Belt stock the Kansas City Southern has voted the stock at annual meetings and has thereby caused the election of certain directors of the companies, "but applicant does not understand that this constitutes the exercise of control over said carriers, or either of them, under the provisions of the transportation act of 1920."

Pointing out that the southwestern region comprises 39,048 miles of Class I railroads, the application states the belief that "this region should be dealt with by your honorable commission as a separate and distinct territory, for transportation purposes, and that the public interest will be best served and promoted by grouping the carriers now and hereafter operating therein into a limited number of systems, so arranged and adjusted as to produce the greatest economies in operation and, at the same time, provide the most efficient service to the public."

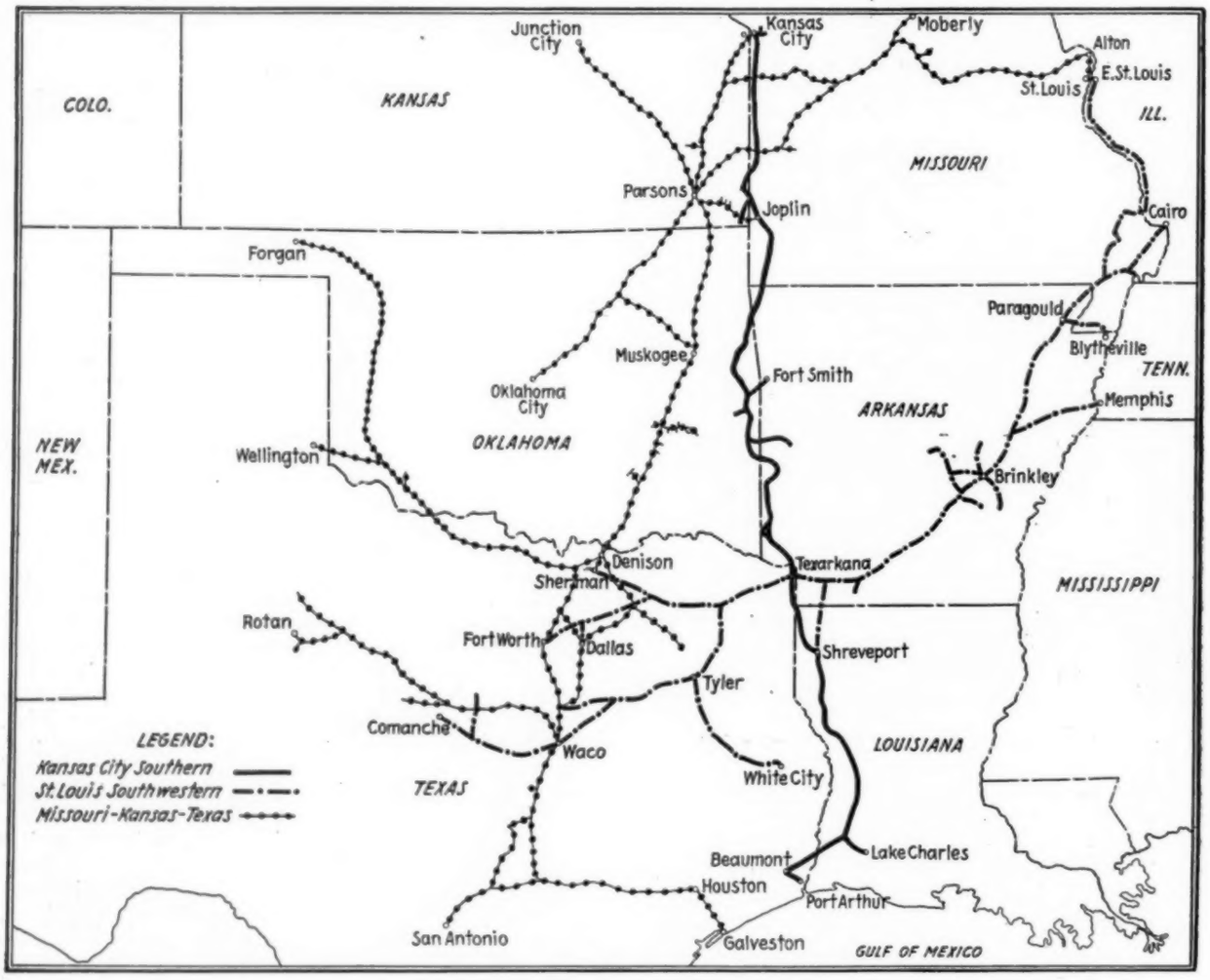
Reference is also made to the number of strong systems that have been and are being formed in this territory, with their mileages in the Southwest, and the application states that of the larger independent carriers in the southwestern region, practically the only ones which remain unattached to some large system are the Missouri-Kansas-Texas, with a mileage of 3,188.54 miles; the St. Louis Southwestern, with a mileage of 1,747.78 miles, and the applicant, with a mileage of 865.10 miles, making a total mileage of 5,801.42 miles, of which 5,629 miles are in the southwestern territory.

The application continues: "It is not only in the interest of these companies, but in the public interest as well, to take steps to carry out the purpose of the transportation act by uniting them into one system, capable of conducting transportation with greater efficiency and economy, and with sufficient strength to meet adequately the competition of the other systems in the territory, rather than to continue to operate as independent and unrelated lines."

Other respects in which it is contended that the proposed acquisitions will be in the public interest are: Reduction of transportation costs by use of easier grades and more direct routes, equalizing loaded and empty car movement, elimination of duplicate terminal facilities and forces, and by interchange of car supply and other facilities. Shippers will be benefited, it is stated, by securing more and direct speedy access to new producing centers and by elimination of delays in switching and transportation generally, while the proposed new system will be in better position to compete with strong systems in the territory than the present individual lines.

It is stated that the line of the Katy intersects the Kansas City Southern at four points, Kansas City, Eve and Joplin, Mo., and Military, Kan., and that the lines of the K. C. S., and the Cotton Belt intersect only at Texarkana, Tex., and their main lines are not parallel. The lines of the Katy and Cotton Belt do not parallel each other except in the sense that both serve St. Louis, Dallas, Fort Worth, Waco and certain other Texas points.

The applicants assume that the applications will be considered by the commission concurrently, and, so far as may consistently be done, as one plan or project, and they request that they be so considered.



The Loree Southwestern System

THE PRESENT AMERICAN GENERATION, says the Virginian-Pilot (Norfolk, Va.), has rebelled against plain black and plain white with their effacement of individuality, and demands color and design. You see it in motor cars, in houses, in wall paper, in plus fours—yea, even in pajamas. Fords have been coming in colors for many months and now, according to a Southern Railway announcement, we are to have polychrome locomotives. The Richmond plant of the American Locomotive Company is making for the Southern a flock of engines that will be trimmed in gold, bottle green and burnished steel. It is possible that the consideration of higher visibility has entered into this reform—a depressingly large number of people injured at crossings enter the defense that they didn't see the train coming—but the likelihood is stronger that the controlling idea was to get into step with the contemporary movement toward color and design to give the people something that would not only pull like sixty but gladden the eye.

Public Relations Work of Railroads*

Sound regulation as well as shippers' co-operation essential to good service

By John J. Cornwell
General Counsel of the Baltimore & Ohio

THERE has been a complete change not only in business methods but in the public conscience and business practices of 40 years ago. The practices which were common then, which indeed were the standards of those days, are not now tolerated by our courts, our legislatures or by our consciences.

These changes have marked not only an evolution in the public mind and the public conscience, but have been brought about, in part, by a realization of the fact that the old maxim "honesty is the best policy" is absolutely true. Business men, whether shippers or transportation officials, gradually discovered that fair play, one-price, honest values and efficient service yielded more profit than sharp practices and temporary advantage. They further realized that the best customer was a satisfied customer; that it was their friends and not their enemies who traded with them, and that if business was to be stabilized, made successful and profitable, it was necessary to conduct it upon an honest plane and to secure and maintain the friendship of those with whom they had dealings.

The creation of shippers' advisory boards, their co-operation with the railroads and the reciprocal spirit manifested by the railroads in meeting and dealing with them, mark the high level upon which this new principle is founded.

It is my purpose and thought to go a step further into the field of public relations of the transportation companies, because that general field extends to the question of railroad financing as well as to national and state regulation. It is in that sphere that I have had some experience—as a member of a state legislature, as the chief executive of a state, as a shipper and, at present, as a general officer of a trunk line railroad. In approaching this subject I recall that it was only a few years ago that the large shippers were the severest critics of the railroads, not so much because of freight rates, but because of the shortage of cars which always occurred when business was at its peak and often happened when business was but little more than normal. Today that is all different. It is to those same large shippers, now, that the railroads turn for support and for co-operation when misdirected public opinion, oft fanned and inflamed by politicians or political candidates seeking votes, threatens unwise and hampering legislative enactments.

Railways and Large Shippers

The railroad managements turn to these large shippers for several reasons. One reason is because they have a clearer and better understanding of the problems and difficulties with which the railroads have to deal than does the average voter or citizen. Another reason is because the elimination of car shortages has not been due solely to increased efficiency on the part of the railroad managements or to the increased number of cars and engines, but, in large part, to the co-operation of the large shippers through such methods as are employed by this and similar advisory boards. In turning to the large shippers for sympathy and support, as the railroad managements are bound to do when confronted with a crisis, they make their appeal to men who understand and appreciate the situation, to men who have assisted in securing the efficient transportation service we have today and who have the largest stake in seeing that the efficiency of the railroads shall continue in the future.

That burden of support, however, cannot fairly or properly be laid solely upon the shippers' advisory boards. The railroads owe it to you, as well as to themselves and the general public, not only to furnish ample and efficient transportation, not only to furnish it ungrudgingly and out of a genuine desire to render efficient public service, but also to keep the public properly informed as to the problems and conditions which confront them and to invite the sympathetic co-operation of the general public as well as of the larger shippers making up these advisory boards.

That this feeling and this thought exist in the minds of the management of the Baltimore & Ohio is strikingly shown, I think, by what it has been doing in the field of co-operation on the part of its employees, as well as in the field of public relations. The co-operative movement which was started in 1922 in one of the Baltimore & Ohio shops and has since been extended over the entire system, has been much discussed in newspapers, magazines and other periodicals. I assume that you are more or less familiar with it. The company's public relations work, however, has not had an equal amount of publicity, and for that reason I think I might properly tell you something about it as evidence that this company is keenly sympathetic with the spirit which brought into existence the shippers' advisory boards and which directs their activities.

Public Relations Work of Baltimore & Ohio

The Baltimore & Ohio has a central committee on public relations composed of representatives of the major departments of the company. It has local committees on public relations in 158 of the 175 counties of the twelve states through which the company's lines extend. These committees are part of the Baltimore & Ohio's organization and, briefly, they are designed to furnish a point of contact between the company and its management, on the one hand, and the public which it serves on the other. The members of these local committees are division operating officers, division freight and passenger representatives, company counsel and physicians, and various local employees. Many of these men are members of the local chambers of commerce, boards of trade, Rotary clubs, Kiwanis clubs and other business and civic organizations. The members of these local committees aggregate 1400 Baltimore & Ohio men. It is expected that they keep posted about transportation

* From an address delivered at a recent meeting of the Atlantic States Shippers' Advisory Board at Atlantic City, N. J. Mr. Cornwell was formerly governor of West Virginia.

conditions generally and particularly as to the situation with respect to their own company, in order that they may, on proper occasions and within proper bounds, pass correct information to shippers and the public generally in their respective communities. The central committee on public relations endeavors to furnish correct information to the local committees and to supervise their general activities. But the work of these committees is not of an informative character, solely. They are expected to be a sort of clearing house for local requests, complaints or suggestions. Many of these committees are small, especially in the rural communities.

While the relations between the public and the railroads generally are today more cordial and satisfactory, perhaps, than at any other time in the history of railroad transportation, the situation with respect to the Baltimore & Ohio, while it may not be better than elsewhere, I think it is only fair to say that it is equally as good. While that cordial relationship has its foundation in the "good neighbor policy" laid down by President Willard when he came to the company as it's president, and has been augmented and strengthened by the co-operation of his staff in carrying out that policy, and by efficient transportation service, it has likewise been aided and assisted by the public relations committees to which I have referred, which have been in existence a little more than three years.

That you gentlemen appreciate to the last degree the importance to you and to the general public of ample and efficient railway transportation is evidenced by the fact that you have created this advisory board, as well as by the contribution toward securing and maintaining efficient transportation through your co-operation with the carriers. It would be presumptuous, therefore, for me to suggest to you anything on that subject. There is one thought, however, related to it, that I want to leave with you.

Adequate Service Depends on Adequate Earnings

Your co-operative efforts, which have been so helpful in eliminating car shortages, thus aiding the carriers in giving satisfactory service, and the efficient work of railroad operating officers, cannot of themselves guarantee efficient transportation in the future. Something else is needed. New equipment must be acquired annually, new and heavier rails must be laid every year, millions of dollars must be expended also to enlarge terminals, build new tracks, passing sidings and new stations in ambitious and growing communities. All of these things must be done from time to time if the railroads are to keep abreast of the growing needs of the country for adequate facilities. In addition, large sums must be provided for the elimination of old and new grade crossings, many of the latter being brought about by the construction of new highways, for the construction of which the railroads are taxed although used by motor vehicles, both public and private, which operate over them in competition with the railroads. Carriers cannot from their business earn all of the money necessary to take care of these capital requirements. They can only hope to secure it by the issuance of securities which, as you know, can be sold to investors only when they are attractive in character; when the investors are satisfied that the interest or dividend will be paid and, in the case of bonds, that they will be redeemed at maturity. It is useless for me to tell you that unless the carriers are permitted to earn the reasonable income upon the property investment which the law says they are entitled to receive, they cannot hope to continue to provide the new capital necessary for the purposes I have suggested.

At the present time the railroads, while not earning the 5¾ per cent which the Interstate Commerce Commission has said is a fair return, they are, nevertheless, making a better showing than for many years. The fact that they are in better shape financially than heretofore; the fact that some roads, favorably located and fortunately situated, are having what some people regard as excessive earnings, is focusing public attention upon their financial statements. Added to this is the depression in certain industries, particularly in agriculture and the bituminous coal trade. Undeniably, there is a considerable percentage of people who do not differentiate between a private business and the business of a common carrier or a public utility. Not everybody stops to consider that the railroads or other public utilities must continue to operate regardless of whether the business is profitable to the owners or otherwise. The public demands and is entitled to continuous operation. In addition to that, it demands, expects and is entitled to efficient operation, and in times of depression, economies on the part of the railroads and other public utilities can be made effective only to a limited extent. Private business, on the other hand, is not subject to governmental regulation and can reduce its output even to the point of closing its mine or its factory when deemed necessary.

It is not unnatural, perhaps, that business men engaged in industries that suffer from periodical depressions feel that the railroads should share their losses, or, at least, there should be frequent rate adjustments to meet the fluctuating conditions that often occur in industry. Any such policy, however, I hardly need suggest to you, would not guarantee future successful railroad operation or future ample and efficient transportation. On the other hand, the introduction of such a policy of rate making would not only destroy the stability of railroad securities already outstanding, but would make it impossible for the railroads to secure the necessary funds for future capital requirements if railroad transportation is to properly take care of the rapidly expanding growth of the country.

This thought is given to you because there are ample indications of a growing sentiment in certain communities and even in Congress itself for alterations, revisions and adjustments of rates to meet the passing phases of the trade and commerce of the country. A widespread sentiment of this character or a pronouncement of such a policy by the governmental authorities would act immediately as a deterrent upon railroad improvement, expansion and development. It is well understood that at least three-quarters of a billion dollars of new money must be provided and expended by the railways annually if they are to keep abreast of the growth and development of the country. That capital can only be looked for from those who are willing to invest their money, as they have been so generously doing for the past three years, upon the belief that the present policy of railroad operation will be continued, and that no new, untried or radical innovations will be introduced.

You gentlemen understand and appreciate, I am sure, how difficult it is for the railroads to operate efficiently and, at the same time, comply with all the laws, state and federal, which impose penalties for their violation.

Railways Regulated by 25,000 Laws

Despite the fact we have the Interstate Commerce Commission, created by Congress, with almost unlimited authority with respect to rules and regulations governing the operation of the railroads; and despite the further fact there is a railroad or public utility commission in each state, with power to make other rules

and regulations respecting intra-state business, there is in addition an almost unbelievable number of regulatory statutes, so many indeed that it is impossible, even for the legal staff of a railroad, to keep track of all of them.

You will, I have no doubt, be surprised to know that a recent compilation of these regulatory statutes revealed that there are 5,000 Federal laws with penalties governing railroads and that, on the various state statute books, there are, in all, 20,000 laws governing railroads.

I am not inveighing against government regulation of railroads. I believe it is necessary. I am hoping, however, that it will not go any further, certainly not for the present. It is a costly thing, in many instances, and in the last analysis you and the other shippers pay it in large part.

It occurs to me, therefore, to suggest that the railroad representatives, as well as the large shippers whose future business success depends upon efficient transportation, should co-operate in preserving stability in the various phases of present railroad regulations. While there may be, and no doubt are, some things that could be changed for the better, it must be admitted by those who have given the subject serious and intelligent consideration, that viewed from the standpoint of the country as a whole the present laws pertaining to railroad transportation are workable and sufficient, and in time what now might appear disadvantageous in some directions will be righted.

Train Control Order Suspended as to Some Roads

WASHINGTON, D. C.

A MORE liberal policy on the part of the Interstate Commerce Commission in applying its orders requiring installations of automatic train control seems to have followed changes in the make-up of Division 1 of the commission, which handles such matters for the commission. The commission on July 22 made public an order by Division 1 suspending until further order of the commission the effective date of the first train control order, of June 13, 1922, in so far as the order applies to the Kansas City Southern. Commissioner Esch dissented. There was also made public an order suspending as to the Chicago & Alton the effective date of the second order, of January 14, 1924, while the effective date of the first order was postponed to January 1, 1927. The second order had previously been suspended as to the Missouri Pacific and the New York, Chicago & St. Louis, in consideration of installations of block signals, and in the past two or three weeks many orders have been issued postponing to the end of the year or dates in the latter part of the year, the time for the fulfilment of the second order, under which the time had previously been extended generally from February 1 to July 18. Some postponements have also been granted under the first order.

For a time train control matters were handled mainly by Commissioners Esch and McChord. Later the orders were signed by Commissioners Esch, McChord and McManamy as Division 1, and after Commissioner McChord's resignation, Commissioner R. V. Taylor, formerly a railroad operating officer, was added to Division 1. The make-up of the commission's divisions changes from time to time and for different classes of cases, but for some time the train control orders have been issued under the names of Commissioners Esch, McManamy and Taylor. In July, 1924, when the commission modified its order of January 14, 1924, so as to suspend the requirements as to the 42 additional roads named that were not included in the first order, Commissioner McManamy filed a separate concurring opinion outlining his views on the subject of train control, favoring a more liberal policy and urging that the commission give more consideration to the need for extension of the block system, particularly with reference to the requirements of different roads.

The order as to the Kansas City Southern, dated July 9, was issued following a hearing on a petition of the road for a suspension until further order, and the conclusion reached "that applicant's road is of such a character, and its operating conditions and traffic density are such as not to require at the present time the installation of automatic train-stop or train control devices." The Chicago & Alton case was handled by a formal order, without a report.

Among the reasons given by the Kansas City Southern for indefinite postponement of the order was that the cost of train control would reduce its resources relied upon to carry out and complete the proposed merger with the Missouri-Kansas-Texas and the St. Louis Southwestern.

Progress in Train Control Installations

Ninety-eight per cent of the work in connection with the installation of train control devices by the railroads, in compliance with the first order of the Interstate Commerce Commission, affecting 45 roads, has either been actually completed or is under way, according to a statement issued by W. J. Harahan, president of the Chesapeake & Ohio, and chairman of the General Committee on Automatic Train Control of the Association of Railway Executives.

Up to July 1, of 7,770 miles of track affected by the order, train control devices were either in actual operation or under construction on 7,503 miles of track, Mr. Harahan said. Thirty-four roads, covering 5,841 miles of track have the work completed except possibly the completion of the installation of apparatus on a few locomotives. About 3,700 locomotives are involved in the first order.

"The work of installing automatic train control devices on the Class I roads is proceeding as expeditiously as possible in accordance with two separate orders by the Interstate Commerce Commission," according to the statement. "The first order affected 49 roads, four of which were afterwards exempted, leaving 45 upon which installations were required. The second order affected 47 of the 49 roads originally selected but since then there have been seven exemptions and two indefinite postponements made by the Interstate Commerce Commission, which left 38 roads affected by the first order under obligations to install train control devices on a second division. The time for completion of the work under the first order was January 1, 1925, while under the second it was February 1, 1926. Extensions, however, have been made from time to time by the Interstate Commerce Commission but only when it was evident that with the best efforts it would be impossible for the carriers named in the orders to prepare plans, secure material and install apparatus in the time originally given.

"The second order, requiring train control devices to be installed on a second division and affecting 38 roads, covered a track mileage of more than 7,500 miles; of that mileage construction work is now under way on 4,602 miles or 62 per cent. Installations of train control on nearly 1,000 miles of track included in the second order has

been completed. It will also be necessary to equip more than 2,700 locomotives with special apparatus so that the train control devices can become operative.

"Full compliance with the orders of the Interstate Commerce Commission with respect to the installation of train control, however, goes considerably further than the mere construction work. The installations after completion are, according to the Transportation Act, subject to inspection and approval by the commission and this approval covers not only the device itself but the way in which the installation has been completed. As there has been practically no use of train control on the steam roads of this country prior to the issuance of the commission's first order, it was necessary to develop not only the engineering features of various train control devices, but also to co-ordinate existing operating rules with the new methods of operation required in order to secure the best results under a train control installation. The inspection by the commission's engineers of an installation, which might involve 150 miles of road with possibly 100 locomotives, requires considerable time, after which the report must be prepared and the results analyzed before the railroad can learn whether, in the opinion of the commission, its installation meets requirements. The work is proceeding as expeditiously as possible."

Lehigh Valley Asks Extension of Time for Train Control Installation

The Lehigh Valley, in a petition to the Interstate Commerce Commission for a year's extension of time for the completion of the automatic train control installation required by the commission's second order, of January 14, 1924, gives as its reason that it would like to arrange for the equipping of its second division with the Miller intermittent induction system, as recently put in service on the Toledo-Detroit division of the New York Central, if it can be made interchangeable with the General Railway Signal Company system already installed on the first division, under the arrangement which the signal company has made to use the Miller system under license. The commission granted an extension to December 31.

The Lehigh Valley in its petition, stated that it was negotiating with the General Railway Signal Company for the same device that was installed on the first division with a view to letting the contract for the equipment of its second passenger locomotive division specified in the second order, which includes its main line between Easton and Sayre, Pa., 214.42 miles and involves 175 additional locomotives. It also stated that the delay in entering into a contract for the second division "is due to the continuous study of the devices installed on the first division and reaching a determination as to whether this device should be installed on the second division." The petition continued:

"The petitioner's officers have further continued their study of the Miller train control intermittent induction device as installed on the Toledo-Detroit division of the New York Central and in service operation thereon since April 1, 1926, for the purpose of comparing such apparatus in every respect with that already installed on the petitioner's first division as hereinbefore described. It is represented to the petitioner's officers that the track elements of the Miller intermittent induction device, which are located level with the top of the running rail, present many desirable features from an operating standpoint and provide inherent safety in freedom from grounds and short circuits which might cause a clear failure; also that the wide air gap afforded by the Miller intermittent system is attractive from an operating viewpoint because of its simplicity, safety, flexibility and low cost of maintenance. These characteristics of the Miller intermittent induction system, as now in service on the New York Central, are under constant study and observation by the officials of your petitioner.

"Within the past few weeks, as evidenced from the columns of the public press, and the official announcement of the president of the General Railway Signal Company, the General Railway Signal Company has secured the exclusive license to manufacture and sell the Miller train control devices, including the intermittent induction type, as now installed on the New York Central. We are advised that it is the intention of the General Railway Signal Company and the Miller Train Control Corporation to develop some means of interchangeability or standardization of the two intermittent types of the said companies. It is highly desirable to have on the lines of your petitioner one type of train control or that subsequent installations be made interchangeable.

"Your petitioner is prepared to enter into a contract with the General Railway Signal Company, as licensees of the Miller Train Control Corporation, for the equipping of its second division with the Miller intermittent induction system if it can be made interchangeable with the system already installed on its first division.

"The Miller intermittent induction system has been developed and put into service operation on the New York Central since your petitioner made the contract for its first division with the General Railway Signal Company. Your petitioner represents that the General Railway Signal Company, as sole licensee of the said Miller intermittent induction system, is peculiarly well equipped to manufacture in quantity production and to aid in the improvement of design, if any, of the Miller system when such studies and tests have been completed by the respective engineering departments of the General Railway Signal Company and the Miller Train Control Corporation.

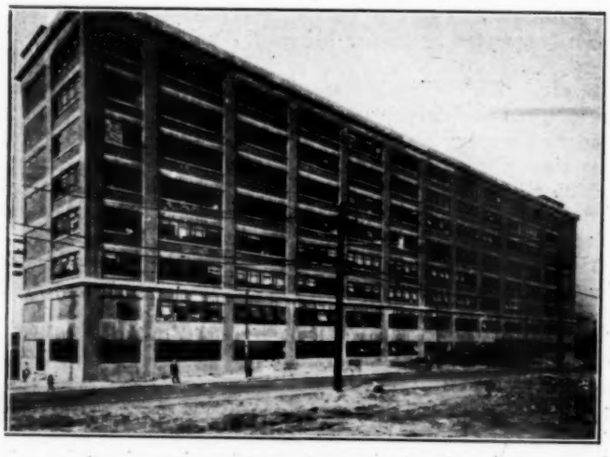
"Your petitioner, therefore, respectfully represents that it should have more time within which to arrive at a definite conclusion as to the type of train control to be used in the installation of its second division and which may possibly involve the rearrangement of the installation on its first division."

Other Extensions of Time Granted

The Interstate Commerce Commission has extended the time for the fulfilment of its second automatic train control order in the case of the Central of New Jersey to January 1, and for the fulfilment of its first order in the case of the Chesapeake & Ohio to November 15.

The Interstate Commerce Commission has relieved the New York, Chicago & St. Louis from compliance with its second automatic train control order, until further order of the commission, in consideration of the petitioner diligently proceeding to install block signals between Conneaut, Ohio, and Arcadia, Ohio, a distance of 169.8 miles.

This is the second order of this kind issued by the commission recently, the Missouri Pacific having been relieved of compliance with the train control order, until further order of the commission, in consideration of an installation of block signals.

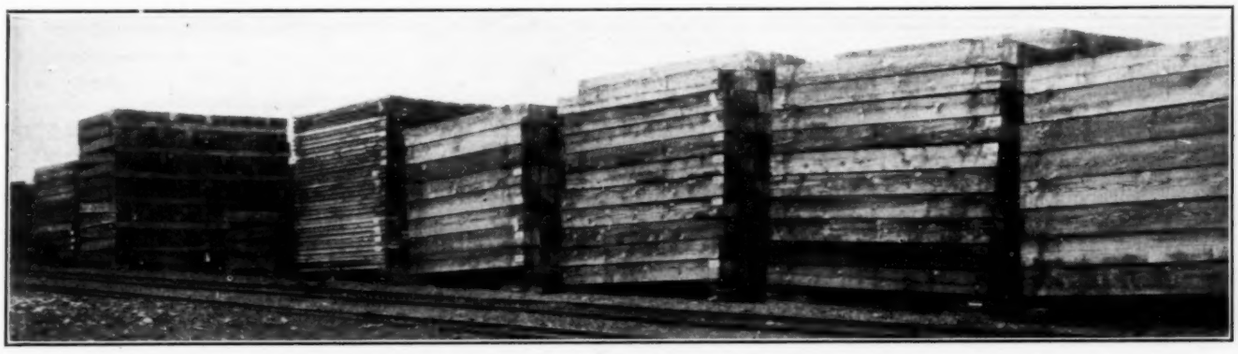


Boston & Maine's New General Office Building at Lechmere Square, East Cambridge, Mass.

Burlington Smooths Out Bridge Material Problem

Better deliveries and fewer pile drivers under present methods of handling improvement work

WHEN heavy rains and swollen streams washed out 50 miles of Burlington tracks in Wyoming in 1923, and momentarily threatened further depredations the supply department of this road distinguished itself by the expeditious manner of meeting the demands for material which the emergency created, for the initiative of this department in rushing three staff officers to the scene and the action of these officers from their respective stations (one at the north end of the work, a second at the south end and the third operating at large) were the outstanding factors in the arrival of material on time notwithstanding the remoteness of supply bases and the repeated necessity of last-minute measures to replace shipments unexepectedly marooned by advancing waters. The active interest of the supply department of this road in effecting timely deliveries of material had been evidenced before the Casper washout, however, in the handling of routine bridge repairs where co-ordinated efforts of this department and the engineering department have been productive of economies.



Creosoted Bridge Caps and Lumber at the Galesburg Yard

Eight Pile Drivers Serve 20 Divisions

The facts are that whereas not many years ago there was a pile driver for every division of this road and habitual breakdowns in the service of supply, an equal amount of improvement work is now being accomplished with only 8 pile drivers for the 20 divisions and with practically no delays in the delivery of material while work train service has been greatly reduced and accounting considerations also served. This has been accomplished in the main through the development of a system, the outstanding characteristics of which are tne practice of the system bridge engineer to issue all requisitions for the material needed and to asign all work equipment and that of the supply department to ship the material when and only when the bridge engineer calls for it and then always in complete form, loaded in such a way as to facilitate handling when received.

The procedure begins with the division master carpenters. It devolves upon these men to make their recommendations each fall for the renewal of pile bridges. These recommendations are then forwarded to the bridge engineer who, with the assistance of system supervisors of bridges, personally inspects all of the structures posted for repair or renewal following which the bridges needing replacement are placed on the budget for the following year.

All Requisitions Prepared by Bridge Engineer

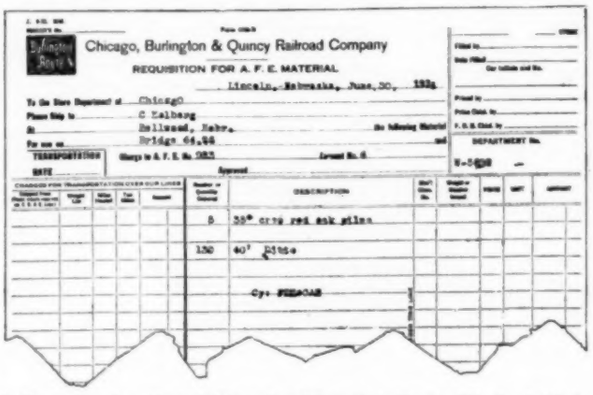
The budget is usually completed and approved early in December of the year preceding the work, whereupon bills of material are made up by the bridge engineer covering all material required for the program. The bridge engineer then prepares the requisitions for the material for each pile bridge, which requisitions are completed early in the year—usually during the month of January—and the entire collection is delivered to the general storekeeper who also receives a recapitulation list showing the A. F. E. numbers, the bridge numbers and the requisition numbers grouped according to divisions. This transaction is completed before formal authority has been secured for each project but informal authority is

given the general storekeeper by the operating vice-president to fill such requisitions on the request of the general manager or bridge engineer. The supply department is thus in a position to make preparations for deliveries in advance of the time they are to be made.

The supply department's preparations for procurement, as distinguished from deliveries, however, are begun a year in advance of the arrival of requisitions. This is because of the practice of treating most of the timber now used for bridges on this road, which calls for from eight to ten months' seasoning. To meet this condition the stores department arrives at its own estimate of the requirements. This is determined from reports received from lumber yards of this road. There are two such yards on the Burlington, one located at Galesburg, Ill., 163 miles west of Chicago and the other at Sheridan, Wyo., 150 miles east of its western terminus at Billings, Mont. At both places this road operates tie and timber treating plants. The reports received from these yards are the regular monthly reports of stock on hand. They give the quantity of each kind of bridge material on hand, the amount due, the amount on order, the consumption of the previous year, the month's supply on hand and the surplus, if any. These reports are received by the chief tie and timber inspector who determines the requirements and through the general storekeeper issues on the purchasing department all orders for the material necessary to replenish stock. The stock is thus replenished on the basis of past consumption as determined from the supply department's record.

By the time the requisitions are received from the bridge engineer the piling and timbers have been procured and are seasoning in the yard. From 85 to 90 per cent of all the piling used in bridges on the Burlington is cypress. This is obtained from Mississippi and Arkansas and reaches the Burlington through St. Louis, Mo., and Paducah, Ky. In order to reduce back haul, all cypress piling is stored at Galesburg. The remainder of the piling is western red cedar which, although inferior to cypress because of brittleness of fiber, is acceptable for use in dry climates where the driving is not so hard. Again in the interest of reducing haul, this cedar, which comes from Idaho, is received and held at Sheridan, Wyo. On the other hand, the bridge timber is Douglas fir, all of which is obtained from the Pacific coast through the Billings, Mont., gateway. In this case, considerations of haul result in all lumber used on the lines west of the Mississippi river and also that required on the extensions of these lines across the river to Galesburg being received at Sheridan, while the remainder is shipped from the coast direct to Galesburg to supply the lines east, north and south. A glance at a map of the Burlington will show the advantage of this arrangement.

Since the lumber is secured on the basis of prior consumption rather than knowledge of the exact requirements and because of its being subject to the demands of emergency and special work as well as for regular bridge programs, it eventually becomes important to check the quantity on hand against the actual requirements. The original bill of material which is made out by the bridge engineer is of assistance in this respect. Two bills of materials are prepared, one for the lines west of the Missouri River and another for the lines east. Each comprises a single blueprint which shows in tabulated form for each division the number of each kind of caps, fenders, packing blocks, sway bracing, bridge ties, bulkheading, flooring, and piling and also of the amount of each kind of hardware required. As soon as these bills of material are issued copies are sent to the officer in charge of each material yard with which to check up the material in stock. With the two yards organized as described, it is obvious that the yard on the lines east will have some material in stock for the lines west and likewise that the yard on the lines west will carry some material for the lines east, but with all the cypress held at one point and the cedar at another and the jurisdictions for remaining material equally well understood, it is a simple problem for each yard to ascertain its own responsibility for the material called for.


Chicago, Burlington & Quincy Railroad Company

REQUISITION FOR A. F. E. MATERIAL

Lincoln, Nebraska, June 30, 1926

To the Store Department at Chicago

Please Ship to C Railway

at Railroad, Nebr.

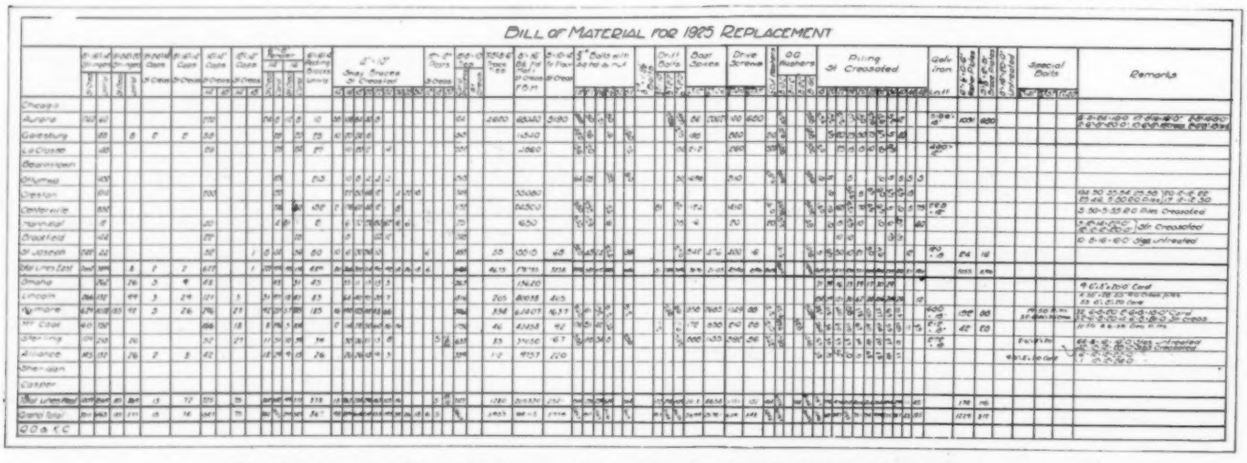
For use on Bridge 64,96

5 35' cyp red oak piles

150 40' Piles

Cyp. WESTERN

A Sample of a Requisition for Material, Each Kind of Material Being Ordered on a Separate Requisition


BILL OF MATERIAL FOR 1925 REPLACEMENT

The Burlington's Method of Recording the Material Needed for Bridge Repairs

When the requisitions are prepared, the material for each bridge is covered by separate requisitions. In addition, the practice is followed when ordering the material for a bridge, of preparing a requisition for the piling, one for the lumber, one for ties, and one for hardware. In every case these requisitions show the person to receive the material, the place of shipment, the bridge number, the A.F.E. number and the account, but they do not designate the time of shipment for reasons to be explained later. Five copies of each of these requisitions are prepared, one going immediately to the consignee and one being retained by the bridge engineer, while the other three go to the general storekeeper where they pass to an A.F.E. desk. The initial action at this desk is that of checking the requisition against the recapitulation list of jobs as prepared by the bridge engineer. One copy of each requisition is then kept on file while the other two, including the original, are sent to the source of supply. Here the purpose of separate requisitions for each class of material becomes operative. If the bridge is on the lines west but in the section where cypress piling is specified, the requisition for the cypress goes to Galesburg on the lines east, while the requisition for the hardware and lumber goes to Sheridan. The requisitions for the material having been forwarded, the situation remains in status quo until the order comes to ship.

1923

LIST OF REQUISITIONS

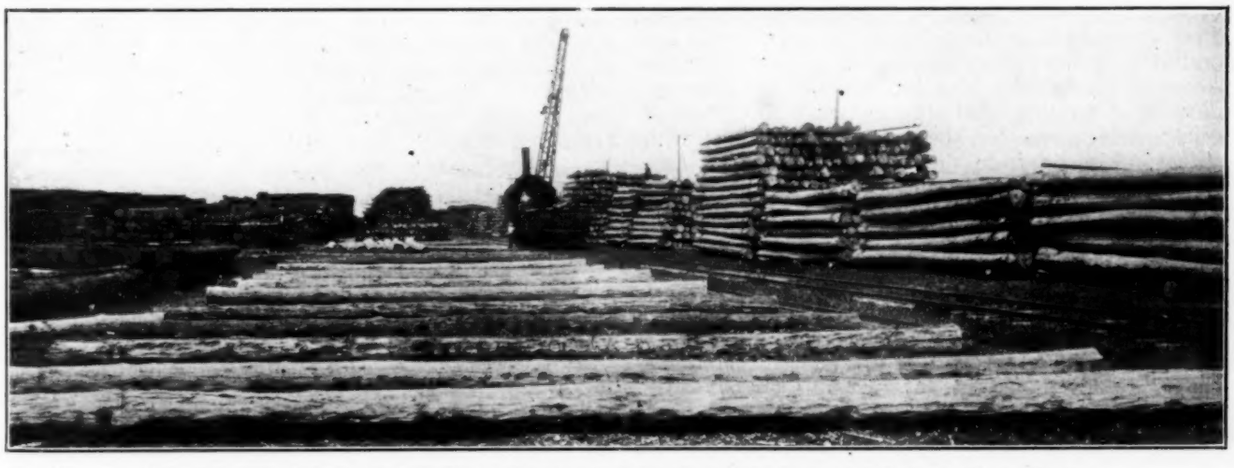
COVERING MATERIAL FOR LINES EAST-PILE TRESTLE RENEWALS

Line	AFE No.	Br.No.	Material Requisition Number Piling	Ties	Trtd. Lumber	S.N. Lumber	Hdw	Misc
AURORA DIVISION								
Montgomery-Streator	16214	63.18	4667	4668	4669	4670	4671	4672
Streator-Walnut	16087	24.83	4673	4674	4675	4676	4677	4678
" "	16217	34.87	4679	4680	4681	4682	4683	4684
Flag Center-Rockford	16219	11.12	4685	4686	4687	4688	4689	4690
" "	16220	22.79	4691	4692	4693	4694	4695	4696
Forest City Branch	16221	0.48	4697	4698	4699	4700	4701	4702
GALESBURG DIVISION								
Galesburg-Savanna	9177	223.79	4703	4704	4705	4706	4707	4708
Fenton Jct.-Ebner	16227	67.98	4739	4740	4741	4742	4743	4744
Galva-Gladstone	16315	41.75	4745	4746	4747	4748	4749	4750
Galesburg-Quincy	9179	177.48	4751	4752	4753	4754	4755	4756

A Portion of the Bridge Engineer's Schedule of Work Listing All Work by Divisions and Giving the Requisition Number for Each Kind of Material

This order, as before stated, comes from the bridge engineer, who issues it as soon as it is certain that the work on the bridge in question will be undertaken. The bridge engineer can do this since it devolves upon him to assign the pile drivers. The practice is for the bridge engineer with the assistance of two supervisors of bridges—one for the lines west and the other for the lines east—to develop a program under which the pile driving work is done. This program is developed in such a way as to provide for the driving of all piling on any line while the driver is passing over it, thus reducing the movement of drivers to a minimum. The program fixes the tentative date for the driving on each line, but as the season advances it devolves upon each division superintendent to inform the bridge engineer when he needs or can use the pile driver. The two officers arrive at the best date for the work under the circumstances and the supply department is advised to ship the piling, instructions to ship the remaining material being given later. Usually the request for shipping material involves a series of bridges.

When instructions to ship are received by the stores department, the store department's copy of the bridge engineer's recapitulation of jobs furnishes a convenient means of determining the requisitions covering the material for the jobs in question and instructions are immediately transmitted to the holders of requisitions, whereupon the storekeepers at the supply points place in the hands of the proper loading foreman, the carbon copies of the requisitions which were previously sent to these supply points. The loading of piling and lumber is accomplished by a travelling crane and the material is loaded on flat cars. In exceptional cases coal cars may be used for this purpose. Usually the loading of the material for one bridge is completed before the work of loading that for another bridge is started. Where small shipments are being made, the materail required for one job is invariably separated from the material for another job. This is accomplished by laying strips between the material on which the order numbers are marked and also by expressly tagging the material wherever this is considered necessary. Moreover, in loading material for several points, the shipping is planned so that the material for the nearest point is placed on top, while that for the most remote point considered in the shipment is placed on the bottom so that there is no confusion on the line in unloading the proper material as each job is



The Cypress Piling Used on the Burlington Is Stored at Galesburg to Eliminate Back Haul

reached. Finally, the material for a bridge is all shipped at the same time, except where the piling is to be shipped before the rest. Where a job requires materials from Galesburg and Sheridan, shipments, of course, are made from both points, but with the above qualification all of the material called for in the requisitions at each point, including the hardware, goes forward in the one shipment. Shipping notices are sent out on the same day as the material is shipped so that all parties concerned can make proper arrangements for handling and for the additional purpose of furnishing the bridge foreman with the information with which to check quantities. The shipping notice corresponds to an invoice. Where the material is shipped in "peddler" cars the way bills also furnish an itemized list of the material which is acceptable for checking purposes. With these precautions, there is little chance for confusion at destinations over what material should be unloaded in those cases where material for more than one bridge is shipped on the cars reaching the job.

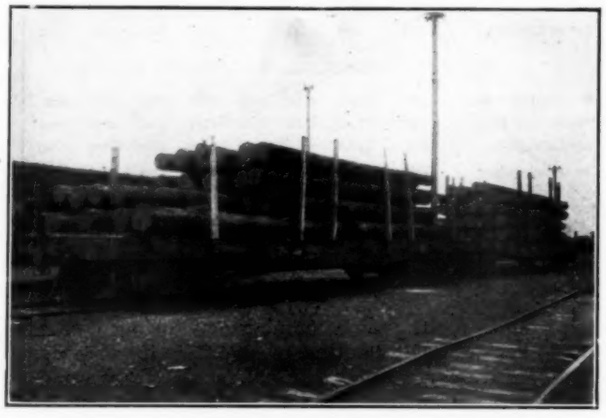
Many Advantages

The plan outlined is quite different from the earlier method of carrying out bridge renewal work on this road, but it has proved the means of curing many of the ills of former practice and has added numerous incidental benefits. In the first place, it is well adapted to the policy of concentrating material in yards situated advantageously with reference to sources of supply and to its distribution without back haul, where also the opportunity is afforded of carrying the least stock for all needs and where equipment and organization can be maintained for handling material economically. Consistent with the practice of this road to replace all timber trestles with creosoted structures of the ballasted deck type, except where masonry is called for, the material at both Galesburg and Sheridan is thus treated and framed ready for application on delivery and it is all stored according to an arrangement adapted to the employment of self-propelling locomotive cranes for unloading and shipping.

Present methods, while reducing in no wise the responsibility of this road's divisional organization for the upkeep of its bridges, also provide for effective coordination of the divisional organization with officers of special qualifications for the work and familiar with policies and needs from the system standpoint. One result of this is the opportunity for greater success in standardization of material and the elimination of waste and confusion through the personal contact of the bridge engineer with inspection work and the preparation of all requisitions at one point.

From strictly operating viewpoints, present methods are particularly interesting for the better utilization of work equipment. As stated above each division was formerly equipped with a pile driver, each of which required a work train. There are still four of these machines available for use in emergencies or on special work where a work train must be employed at all events, but with the bridge engineer responsible for the assignment of this power, the work formerly done with this equipment is now being accomplished with eight machines which, being self-propelling, largely dispense with work train service as well as affording the advantages that result from the more continuous employment of pile driving crews than where pile drivers are idle much of the time.

Of equal importance to this reduction in investment for machinery and the cost of operation through better utilization, however, is the improvement that has taken place in the supply situation. This improvement has been especially marked. However, delays in delivering material and shortages persisted even after the supply department began to secure its requisitions from the bridge engineer. The difficulty at this time was attributed first to the practice of prescribing the dates of delivery on requisitions which was done according to the schedule of work made out by the bridge engineer. The trouble with this plan was its inflexibility, for as the season progressed material was being delivered to jobs where it was not needed immediately because of revisions in the original schedule, while material required at other jobs had not yet been shipped. This led to the plan of omitting the date of delivery from the original requisition and of placing the responsibility on the superintendents to issue instructions when deliveries should be made. But this did not remedy the trouble for division superintendents, in their desire to be certain of having material would commonly call for deliveries well in advance of needs. Thus one superintendent who seemed most anxious to co-operate with the stores department in its problem was found to have called for deliveries for



All Material for Bridges Is Shipped on Flat Cars

all of the material for his 28 bridges in the same month. It was these experiences that resultd, threfore, in the adoption of the practice of holding all material in the yard until the receipt of instructions to deliver and of so arranging that the instructions would come only from the bridge engineer after he and the superintendent had agreed in every case upon the time when work on specific bridges should be done. For the current year this road has 250 bridges on its program for renewal work which require approximately 170,000 lin. ft. of piling. These bridges are in process of repair at the present time under the methods of work perfected as outlined, and are reported to be affording every reason to expect that the procedure will prove as beneficial as it was last year.

In recent months there has been considerable agitation over the discovery that some roads follow the practice of charging material and supplies to operating expenses when shipped by their store department to the points of consumption, while other roads charge this material off the store balance only when information is received that it has actually been applied. While the Chicago, Burlington & Quincy is among those roads which have followed the former practice, it should be noted in connection with this road's bridge repair methods, that in charging this material off the books when shipped, it is, for all practical purposes, also following a policy of charging it off only when applied, since the time interval between the shipment of the material and its application is only a matter of a few days, not only with reference to piling but with the balance of material as well.

Electrification of Chicago Terminals Agitated

Special committee of city council hears views of railway executives—Advantages and difficulties analyzed

CAN and should the terminals of railways in Chicago be electrified, was the question considered at a series of public hearings on railway electrification in Chicago held by a committee of the city council, beginning July 19. The object of the hearings was to ascertain the attitude of the railroads toward the abatement of the smoke evil and the feasibility of a comprehensive city-wide railway electrification program. The railroad viewpoint was expressed by F. L. Thompson, vice president of the Illinois Central, H. E. Byram, receiver of the Chicago, Milwaukee & St. Paul, Hale Holden, president of the Chicago, Burlington & Quincy; E. H. Lee, president of the Chicago & Western Indiana, and L. C. Fritch, vice president of the Chicago, Rock Island & Pacific.

The Illinois Central's Program

Mr. Thompson described the events leading up to the electrification of a part of the Illinois Central lines in Chicago. He referred also to the great difficulty and expense of the work. As to the advantages of electrification from the railroad standpoint, he said in part:

As far as the advantages to the railroad from an economical standpoint are concerned, there aren't any because we are not making any money now on the suburban service, and we have invested about ten million dollars in new cars and several million more in the electrification project. But while there are some economies in operating electrically where the density of service is such as to warrant it, the saving is so small as not to yield any return at all on the investment.

Electrification of the suburban service, we think, will help increase business, but that does not apply to other services. We hope that our suburban service will increase some of the suburban territory along our lines, and that the property will be built up some. Also some better service can be given in cold weather for motors operate with higher efficiency in cold weather than in warm weather. There will be less noise, less smoke, and patrons will be given better service. Also, there is no doubt but that electrification of the suburban service makes more homesites. People can get away from apartment houses and live away out in the country and they can get in to town faster than with steam. It will also reduce the noise where there is switching. It probably has some advertising value to the city.

There are probably other ways of taking care of this than by complete electrification. Some attempts have been made with oil engines. The Chicago & North Western is trying out an electric locomotive with storage battery. There is one disadvantage in electrifying the freight service, as we are now, because we have so many transfer trains and so much transfer service. If we get to straight electric locomotives, we will have to get some other kind of power to run over to the other yards with transfer business.

When you come to compare our suburban service with others you will find we have a more dense traffic than any other. It takes a dense traffic and a fast service to make electrification pay. As far as getting rid of smoke, of course, we don't save because the Commonwealth Edison Company will burn about a third as much coal as we burn to generate this electricity.

Answering questions of the committee, Mr. Thompson said that the development of air rights by his company's electrification is expected to be of considerable value. The future course of the Illinois Central, he said, would depend largely upon the action taken by other railroads. If 80 per cent of the roads which will use its proposed terminal at 12th street electrify their through passenger service, the Illinois Central will do likewise, he added.

E. H. Lee Outlines Considerations on C. & W. I.

E. H. Lee, president of the Chicago & Western Indiana, appeared before the committee on Wednesday. He said in part:

The Chicago & Western Indiana and the Belt Railway of Chicago, which I represent, are terminal railroads local to the city of Chicago, and therefore this question of electrification of the railroads in Chicago as a means of smoke abatement and in order to secure other possible advantages, is vital to us. It has two sides, as have all such questions. One side appeals to the city authorities and involves questions such as—Will the electrification reduce the smoke nuisance and by how much? What are the possibilities of the development of air rights, and how will this benefit the city? What benefits in other directions will grow out of the proposed electrification of the railroads? Questions on the other side press on the railroads, and some of them are—How much will it cost? Is the cost justified? Can the expenditure be made to carry itself? Will the improvement pay?

A vast sum of money will be required to electrify the steam railroads in Chicago under the plan now being discussed. Judging by the drift of remarks at the conferences already held, city authorities expect to bear no part of this expense. On the other hand, the railroads cannot secure the money required, unless they can show that the investment will carry itself and pay a probable profit; and it should be noted that not a single electrification project on any railroad in the United States has ever been carried out to date on any other basis than that it would stand on its own feet and pay an eventual if not an immediate profit. With the rigid control of railroad expenditures vested in the Interstate Commerce Commission, the probability is remote that permission would be granted for the expenditure of vast sums of money unless the expenditure could be shown to be imperatively necessary on account of the public health; on account of public safety; or in order to make or save money.

Each one of the various electrification enterprises on the steam railroads of the United States was brought about for some special and well recognized reason. Each particular case required its own special investigation; and therefore it is no reason why all of the railroads entering Chicago should be electrified because for special reasons and to meet special conditions the railroads entering New York City or Philadelphia have been electrified. It might just as well be contended that because all the railroads en-

tering Manhattan Island pass through tunnels, all the railroads entering Chicago should likewise be compelled to enter through tunnels.

In the public discussions of this question to date reference has been made to the abatement of the smoke nuisance by the electrification of the railroads. No emphasis has been put upon the fact, however, that the railroads are responsible for only from 10 to 15 per cent of the smoke. I live in a residential neighborhood over a mile distant from any steam railroad track, or tug boat or steamer route. The smoke and soot from the furnaces and stacks of nearby apartments and apartment hotels causes about the same amount of dirt in this region as in the loop. Curiously enough, it is much dirtier in our apartment by reason of smoke and soot in the winter with the windows closed than in the summer with the windows open; and yet the railroads run the year around. Your committee and the public authorities will undoubtedly wish and expect to deal in an even handed way with all the various interests involved in this question. It is probably due to an oversight that little has been heard during these conferences as to the smoke nuisance from apartments, hotels and manufacturing plants, notwithstanding the fact that, if the best information so far developed still holds true, these produce from five to ten times as great a volume of smoke as the railroads.

H. E. Byram Discusses Electrification Benefits

Mr. Byram told of the St. Paul's experience with electrification in the west. His remarks are abstracted:

We have had some experience with electric operation, although under entirely different conditions from those which prevail in Chicago. There were two reasons for our electrification. One was that there was water power available to generate the current at a very low price. The other reason was that in this mountain operation we use a great deal of current and that makes the operation much more attractive from an economical standpoint. The cost of fuel would be very much higher, of course, on that kind of a railroad than it would here on the level, so that the opportunities for a saving by electrical operation are greater there. We have within the city limits of Chicago a total of 81.17 miles of main tracks; we have 158 miles of yard and industrial tracks, making a total of 239 miles of tracks belonging to the St. Paul Railroad which would have to be electrified.

Applying the cost per mile, (of the existing installation) either the $40,000 of the second installation or the $20,000 of the first, or a compromise between the two, would give a pretty fair idea of how much it probably would cost to electrify Chicago. That is an expenditure which, to be attractive to a railroad, ought to produce a return that would justify making it. I think the city of Chicago is more likely to make progress in this direction if it can be shown by a careful and accurate study that an investment in this sort of an improvement can be made to pay.

Hale Holden Describes Burlington Situation

Mr. Holden reviewed the 1915 report on the smoke situation in Chicago and urged that it be brought up to date. His remarks were, in part, as follows:

It is interesting to note that in the results of the report made in 1915 the relative amount of smoke and other features contributed by locomotives were classified and that the suburban passenger engines in Chicago consumed only 0.88 per cent of the coal consumed in Chicago; the suburban passenger engines contributed only 1.54 per cent of the visible smoke in Chicago and only 0.64 per cent of the gas as the combustion discharge into the atmosphere in Chicago; and only 1.97 per cent of the solid constituents of smoke in Chicago. In 1913 we operated 28 eight-hour shifts of switch engines between the Union Station and 16th street, which included our freight terminal at Harrison street, and our coach yard at 14th street whereas we are now only operating 14 engine shifts. Between 16th street and Western avenue we were then operating 30 eight-hour shifts of switch engines in transfer service while we are now operating only 21; while from Western avenue west to the city limits, including our large Hawthorne yard, which lies adjacent to the western city limits, we were at that time operating 60 eight-hour switch shifts while we are today operating only 21. We have also reduced the number of locomotives that we handled at our house at 14th street from 65 to 52.

The electrification problem is an exceedingly intricate one. It cannot safely be determined, as we believe, without a very careful consideration not only of the relative responsibilities of the different agencies here in the city for what is termed the smoke evil, but also the appalling cost that is inevitably involved in it, and therefore a determination whether that cost can be justified as it may be worked out by an unbiased and expert study of the situation.

At the time the smoke abatement report was made, the estimated cost of electrifying the Burlington and discontinuing the use of steam locomotives in Chicago was immediately brought to the front. The conclusion was that no practical or economical results could be arrived at without extending that electrification beyond the city limits, for we find that the operation of suburban trains by electrical power necessarily involves the starting of the train at its outside limit with electricity or electrical power and carrying on into its terminus without change of power. A change of power can be endured with the through passenger trains without substantial delay, but suburban service appears to require that the same unit of power should carry the train on into the terminal, and that means that if electrification of the passenger service was established, the same unit of power would have to go in and out from the same point. At that time the result of the study was that the cost would be approximately ten million dollars on the C. B. & Q. for electrification. It is certain that this would be no less than 20 million dollars if it were undertaken now; and therefore, that brings us to the question of how the money will be raised. It would have to be raised by the use of capital and would have to be justified before the Interstate Commerce Commission, which has ultimate and exclusive jurisdiction over the issuance of additional capital, and also would have to be justified by the measure of return that would result.

The commission found in the 1915 report that even the cost in those pre-war days was so great that the electrification of the railroads here in Chicago was financially impracticable. The impression is that that would be the result today, but, nevertheless, I think that the railroads are ready and willing to enter into a further study of the matter—with the further development and the further increase of business in Chicago, both freight and passenger, in an unbiased way in order to find out what the truth is about the situation to date.

We are watching the operation of the oil engine, one or two of which are in Chicago, which do not emit any particular amount of obnoxious gas, but those locomotives are not feasible for the movement of heavy passenger trains, or for suburban trains, or for any of the important freight service here in Chicago.

The Burlington has been in close contact with one of the largest locomotive builders in the country for over two years, looking for an oil-electric engine that will

handle the heavier trains and we have the promise of a large engine which is now in the experimental stage, as soon as the manufacturers building it are willing to let it go with the expression that they believe it has reached a point where it can be used effectively in service of that kind.

The oil-electric engine is approaching maturity and within the next two years at the most we should have units of power of that sort. Any further study of the question of smoke elimination would naturally bring into the subject these new inventions and the progress of it up to the present time.

C. Fritch Testifies

Mr. Fritch referred to the progress already made by the railroads in reducing the smoke nuisance. He doubted that electrification of the railways would improve the situation much. He said in part:

The railroads have done a great deal in this matter in the last 10 or 12 years, since this report that Mr. Holden referred to was made. This report shows that the coal consumption is about 12 per cent for railroads and 88 per cent for other classes of coal users; and in the analysis of the consumption by railroads it is interesting to note that of the total consumption of 12 per cent, there is six per cent of that fuel used for freight locomotives.

Our freight yards are not located, as a rule, in the congested portion of Chicago but at the outskirts of the town.

Changes Since 1915

If the 1915 report were revised and brought down to date, it would show that the interchange of freight cars in through service in Chicago is now very small, for in recent years the railroads of Chicago have arranged through belt lines for the interchange of through freight traffic.

Considering the area of 50 miles outside of Chicago, 50 per cent of the freight we used to handle is now handled by trucks. The passenger business has fallen off, too. The earnings are less than they were in 1915, because the motor bus and private automobile has taken passengers away from the railroads. Our suburban service has increased slightly, but that is a service that any railroad in Chicago would be glad to get rid of tomorrow, if it could. It will be a hundred years before the Rock Island and the New York Central Lines will derive any revenue from their air rights in the area south of Harrison street. We have inquired into that, but we don't see anything in the immediate future. If we could locate large apartments or large office buildings on our property, that would be another thing, but in the situation we have, speaking now of the Rock Island, we don't see any hope of developing those air rights in the next 50 years that will bring any immediate return or that will contribute towards the electrification development.

Costs Greater Than Estimate

According to the report made in 1915, the cost of electrification to all the railroads would be 254 million dollars, but that does not represent all the cost. When the Illinois Central work was estimated at that time, I think it was something like 20 million dollars, but the Illinois Central's present installation has already cost 48 million dollars or 2.3 times the estimate of 1915. When you electrify a railroad or any part of a railroad, you have to locate your facilities permanently, because you have overhead construction that is very expensive, and you can not shift it around as you can with steam locomotives. You have to put your structures where they will be permanent. That means a rearrangement of your facilities for many years ahead, so the cost of electrification itself is only a very small part of it. Yet the estimate of 274 millions in 1915 could be extended today easily to something like 631 million dollars if you merely based it on the increase in prices. Even then I question whether that would represent the total cost, because incidentals enter into it that can never be taken care of when you make your estimate.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended July 17 amounted to 1,083,626 cars, the highest figure attained this year, and an increase of 70,772 cars as compared with the corresponding week of last year. As compared with 1924 it was an increase of 152,913 cars. All districts reported increases over the corresponding weeks of both 1924 and 1925, as did all classes of commodities except livestock, which showed a decrease as compared with 1924. The largest increase as compared with last year was in the loading of miscellaneous freight, which amounted to 398,668 cars, an increase of 22,842 cars. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

REVENUE FREIGHT CAR LOADING—WEEK ENDED JULY 17, 1926

Districts	1926	1925	1924
Eastern	249,901	238,837	218,984
Allegheny	217,597	206,905	187,937
Pocahontas	60,372	52,815	42,584
Southern	151,303	143,433	127,273
Northwestern	167,741	150,862	144,286
Central Western	159,278	143,381	145,765
Southwestern	77,434	76,621	63,884
Total Western	404,453	370,864	353,935
Total all roads	1,083,626	1,012,854	930,713
Commodities			
Grain and grain products	57,138	43,903	47,548
Livestock	27,302	26,990	32,038
Coal	183,486	171,851	146,703
Coke	11,314	9,294	7,011
Forest products	69,029	68,177	64,602
Ore	75,905	68,177	57,912
Mdse.	260,584	253,945	236,849
Miscellaneous	398,668	378,026	338,050
July 10	900,977	986,893	909,983
July 3	1 072,624	866,199	757,904
June 26	1,062,252	993,173	908,251
June 19	1 043,720	984,583	903,546
Cumulative total 29 weeks	28,093,691	27,194,436	25,784,022

The freight car surplus for the period July 8-14 averaged 239,167 cars, including 70,935 coal cars and 123,268 box cars. The Canadian roads for the same period had a surplus of 25,582 cars, including 22,700 box cars.

Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended July 17 showed little change from the previous week, the increase being only 967 cars. Compared with the same week last year the increase was 9,233 cars.

	Total for Canada			Cumulative totals to date	
Commodities	July 17, 1926	July 10, 1926	July 18, 1925	1926	1925
Grain and grain products	5,111	4,561	4,722	192,454	164,087
Live stock	1,833	2,000	2,150	55,335	60,992
Coal	5,447	5,832	2,083	137,380	91,147
Coke	215	201	316	10,868	7,726
Lumber	4,302	4,066	3,965	100,250	97,329
Pulpwood	2,586	2,672	2,441	84,646	82,585
Pulp and paper	2,304	2,549	1,838	70,360	57,888
Other forest products	2,628	2,560	2,865	92,461	83,080
Ore	2,186	1,624	1,723	44,118	36,790
Merchandise, L.C.L.	17,125	17,308	15,361	445,068	420,847
Miscellaneous	16,612	16,009	13,652	372,081	324,962
Total cars loaded	60,349	59,382	51,116	1,605,021	1,427,433
Total cars rec'd from connections	36,343	34,238	32,722	1,037,611	924,507

Axle Failures in Cold Weather

A discussion of the effect of low temperatures on the strength of carbon steel

By Norman Litchfield

IT seems to be the opinion of many mechanical department men that the number of axle failures in service is greater in cold weather than in warm weather. It is claimed that the larger number of failures is caused by a greater tendency of the metal to crystallize at low temperatures. As this is a question of considerable interest to motive power men, an attempt has been made in this article to assemble such data as is available in connection with the subject, which really resolves itself into four questions: First, is there a greater number of failures at low temperatures than at high? Second, are the failures caused by crystallization? Third, is steel inherently weaker at low atmospheric temperatures than at high? Fourth, are the stresses induced by a given load increased by low temperatures?

The first question may be answered, that the question is so often asked as to indicate that data is available to prove that an increase in axle failures during cold weather does occur, but we do not believe that any data proving this to be true has ever been published. There is always a matter of doubt in judging the accuracy of opinions held on such a subject. To arrive at a safe conclusion, carefully recorded data should be taken over a period of years, to show that an excessive number of failures has occurred with each recurrence of low temperatures. Supporting data is also necessary as to the nature of the break; whether it is a clean-cut snap, or whether it partakes of the nature of a gradual fracture. The latter is familiar to every one who uses steel subjected to constant shocks, vibrations and alternating stresses, such as occur in axles. The reason for laying down this condition is that when shafts of a given design and material fail after long continued rotation and are replaced with shafts of like design and material, it may be predicted with a fair degree of certainty that the new shafts will also fail, roughly speaking, after the same number of rotations, irrespective of temperature conditions, there being a sort of periodic life for a given shaft under a given stress. Both laboratory data and records from actual service confirm this statement. Considerable laboratory data is available, but comparatively little in the way of actual service records has been assembled. For such records, a good and continuing organization is required, coupled with a fair degree of patience, for the reason that the cycle may require a period of from eight to ten years, depending on the mileage made by the vehicle. Therefore, it must be proved that the occurrence of a large number of failures during cold weather has not happened to coincide with the end of the endurance cycle of a lot of shafts which were placed in service at about the same time. Furthermore, examination should be made to see whether the shafts were not about cracked through before they finally snapped in the cold spell. It is, of course, well known that a shaft will continue to run for a considerable time after it has cracked to such a point that only a surprisingly small section remains.

Closely allied with this subject is the question of how high is the normal working stress in the shaft. It is well known that the higher the working stress, the shorter will be the periodic life. This is substantiated by all the series of experiments which have been made both in this country and in Europe over the past 20 or 30 years. Service records show the same thing. One set of shafts of good design, but highly stressed, close to the elastic limit, has a quite definite periodic life, whereas another set of the same general design and material, under a lower stress, shows an endurance life exceeding that of their resistance to wear at the bearings. It is, therefore, seen that all of the facts must be carefully analyzed before attempting to draw the conclusion that low temperatures are the cause of failures.

Assuming for the moment that this is the case, an analysis may be attempted of the possible reasons for such failures. In so doing, it may be simpler to consider the fourth question first; namely, are the stresses induced by a given load increased by low temperatures? This question almost answers itself in the affirmative, particularly in the case of car and locomotive axles. Faulty lubrication, a frozen road bed, sticky triple valves, frozen brake shoes, springs, etc., all tend to throw heavy and sudden strains on the axles, with consequent high stresses which may be accentuated and largely increased locally by poor design, such as sudden change in section, sharp fillets, keyways and other defects. Whether these increased stresses, which are difficult to determine, will be sufficient to bring about failure of an axle that would otherwise be safe, will depend largely on the intensity of the normal working stress in the shaft and its relation to the inherent resistant properties of the steel.

It being granted then that cold weather does tend to increase the stresses in shafts, there then arises the question as to whether the ultimate failure is caused by crystallization, by which is meant some change in the molecular structure of the steel, changing it from a granular substance to a crystalline one.

That some such change does take place is the opinion which is held by many in the practical field, but it is a theory which is thoroughly discredited by metallurgists. It is, however, not to be wondered at that many users of steel should hold to this opinion. A fracture in service often possesses a highly crystalline appearance, particularly in the case of a shaft which has cracked part of the way through over a period of time (a so-called gradual or progressive fracture) to the point where the remaining section is so small that it can no longer resist the strains imposed on it and the shaft suddenly snaps off. The user probably knows that the axle material when purchased new was tested in a tension machine and at that time showed a fine granular structure. If he cuts a piece from the broken axle as close as possible to the fracture and tests this specimen in the tension machine, he will probably find that it breaks with the original granular fracture, free from any sign of crystals. The natural inference is, therefore, that the steel had crystallized just at the point of failure and presumably nowhere else. But if he were to take and polish a specimen from the very fracture itself, etch it and examine it microscopically, he would find the original character of material, which proves quite clearly that no action has taken place, such as is expressed and implied by the word crystallization. The very same steel when

new, had it been tested by first nicking slightly, holding in a vise, and then striking a sharp blow tending to bend it at the nicked section, would have broken or snapped off, showing a crystalline fracture. In other words, it may be positively stated that there is no such thing as crystallization of steel caused by long continued service. Whatever crystalline appearance there may be at the break comes only from the nature of the break, the inherent character of which is considerably different from that occurring in a tension machine, being more nearly akin to a nicked break.

Another term which has long been applied to such failures is "fatigue"—a term which apparently grew up from an impression that under long continued strain the very nature of quality of the steel changes or weakens in the same manner that a muscle weakens, so that it can no longer resist strain. This impression also is not borne out by laboratory and microscopic investigation. The word "fatigue" is still largely used by metallurgists, but it is tacitly agreed that the word is not to

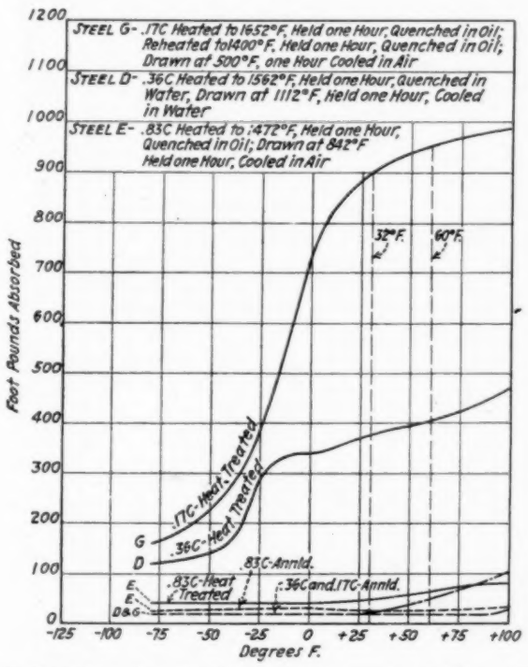


Chart Showing the Resistance to Impact of Three Steel Specimens at Temperatures Below 100 Deg. F.

be taken as implying any sudden deterioration of the metal, but rather a gradual cleaving apart of the steel, particle by particle. This cleavage naturally starts with the fibres nearest the surface which are under the greatest strain, and as they break one by one the cleavage gradually progresses towards the center.

Altogether, the evidence is conclusive that shafts do not break by reason of any change in their crystalline structure. We may, therefore, pass on to the question whether any change occurs in the strength of the steel itself when subjected to low atmospheric temperatures. Existing data on this subject is somewhat meagre. While numerous experiments have been made on the behavior of steel under high temperatures, these experiments have been brought about by the wide use of steel in furnaces and mills which have to operate at high temperatures, and there has not been a similar widespread use of steel at correspondingly low temperatures to force many series of experiments under these conditions. In the last edition of J. B. Johnson's work on "Materials of Construction," it is stated "When steel specimens are exposed to temperatures below the freezing point of water, the static strength is higher and the ductility lower than at normal temperatures." As an example, he cites a test made at the U. S. Arsenal in Watertown in 1905, but it will be noted that this test was made by plunging the steel specimen in a bath of liquid air, the temperature of which was —220 deg. F., a temperature which, of course, is far below any atmospheric temperature even in the most rigorous climate. Hence, it has but little bearing on the behavior of steel at low atmospheric temperatures. As an indication, however, and merely as that, the results of the test may be quoted:

	At room temperature, + 76 deg. F.	At liquid air temperature, — 220 deg. F.
Ultimate tensile strength, lb. sq. in.	72,300	97,600
Elastic limit, lb. sq. in...	52,800	80,000
Elongation, per cent	29.3	10.7

The Engineering Record, July 21, 1906, in quoting the results of the above tests at the Watertown Arsenal, makes this statement: "The results of these experiments are similar to those that have been obtained by numerous other experimenters who have investigated the properties of steel under the same conditions, in that it is shown that a great increase is produced in the tensile strength of steel at low temperatures with a corresponding decrease in ductility." Unfortunately, for our purposes, it does not state who the "numerous experimenters" were. It may be pointed out that the decrease in ductility above observed does not necessarily mean that the material has become less able to resist shock and vibration. The evidence of these tests is not sufficient in itself to prove that steel is weakened by cold.

An early English reference to this subject is found in the Proceedings of the Institute of Civil Engineers, Vol. CXII, in which a description is given of some tests made in Austria in 1892 as a result of some breakages of gun carriages in that country. In these tests, specimens were subjected to two kinds of impact test, longitudinal and transverse, the test pieces being cooled in a solution of ice and salt at a temperature of 4 deg. F. They were plunged in this mixture after each blow. The uncooled specimens were tested at a mean temperature of 68 deg. F. The bars used for the transverse test were nicked with a file across the middle on the under side, and had dropped on them a weight of about eight pounds from a height of six inches. It was found that the resistance to transverse impact was less at low than at normal temperatures; a smaller number of blows being required to produce rupture. The resistance to longitudinal impact was increased "to a remarkable extent by the reduction in temperature, while the elongation also became greater." It may be noted that this statement is somewhat at variance with the results of the Watertown Arsenal tests in liquid air, above quoted, wherein the static elongation was found to be decreased by the liquid air temperature. A summary of the Austrian tests follows:

	Longitudinal impact		Transverse impact		Tensile tests		Condition,
	No. of blows causing rupture	Elongation, per cent	No. of blows causing rupture	Deflection at middle, inches	Breaking stress, tons per sq. in.	Elongation, per cent	warm or cold
Gun carriage steel...	13.0	13.0	26.6	0.6	30.7	24.8	Warm
	26.6	36.4	9.4	0.17	30.09	26.7	Cold
Axle steel unhardened .	13.6	14.8	11.4	0.307	....	....	Warm
	30.3	24.1	5.2	0.165	....	....	Cold
Axle steel hardened	1.0	....	1.0	....	....	....	Warm
	1.0	....	1.0	....	....	....	Cold

It must be remembered, of course, that these tests were made well before the development of modern methods of heat treating steel, which probably accounts for the abrupt failure of the "hardened" axle steel.

An exceedingly interesting review of the history of

the behavior of steel at various temperatures was given in a paper presented before the American Society for Testing Materials in 1924 by H. J. French and W. Tucker, entitled "Available data on the properties of irons and steels at various temperatures." The authors appended a bibliography of the subject, but it is found that, as usual, it refers mostly to the behavior of steel at high temperatures. However, one significant reference is made to a paper in the 1923 Year Book of the American Iron & Steel Institute describing an investigation of the influence of temperature on the Charpy impact value of a group of steels of varying composition, by F. C. Langenberg, metallurgist of the Watertown Arsenal, Watertown, Mass.

In the Charpy test a mounted pendulum is swung about a point and is capable of delivering a blow of about 217 ft. lb. The face of the pendulum is a hardened steel knife edge, rounded to a radius of about two millimeters. The test specimen is a small bar about 10 by 10 by 60 mm., and is notched to a depth of 5 mm. at the center. The pendulum strikes the specimen on the face opposite the notch and fractures it as a beam—chopping it in two, after which the pendulum ascends to an angle which depends on the energy remaining after the impact. Knowing the weight of the pendulum and the height of its center of gravity before impact, the energy of the blow can be determined. The height to which the center of gravity of the pendulum ascends after impact permits the determination of the energy remaining after impact. The difference between these two quantities is the energy absorbed by the test specimen and is the index of the resistance to impact of the specimen. While it is not contended that this test, by itself, gives a complete indication of the ability of a material to resist continued vibration and shock, yet it is in one way a very significant test, and one which, when taken into consideration with other tests and with microscopic examination of the grain structure, helps to obtain a good measure of the material. Mr. Langenberg gives results of his tests with three straight carbon steels, the first having a carbon content of 0.17 per cent; the second, 0 36 per cent, and the third, 0.83 per cent. All three steels were tested in the plain annealed state and also after heat treating. The heat treatment given to the soft .17 per cent carbon steel consisted of quenching in oil, and drawing and cooling in air. That given the mild .36 per cent carbon steel consisted of quenching in water, and drawing and cooling in water. The heat treatment of the hard .83 per cent carbon steel included quenching in oil, and drawing and cooling in air. Each heat treatment was calculated to give the best structure for developing the resistant powers of the material.

Mr. Langenberg states that in considering the heat treated condition "it may be remarked that the low carbon steel had received a treatment corresponding to that received by the core of a casehardened article; the medium carbon steel, a quench and a draw such as would be given when the material is used for structural parts. These steels were tested at temperatures from 80 deg. F. to high temperatures, which we are not concerned in this article. We have redrawn from the curve given in Mr. Langenberg's paper that portion which lies between 100 deg. F. and 32 deg. F., this being the range in which we are more particularly interested. This is shown in the chart. Mr. Langenberg states that "at a temperature of zero deg. F. and lower, there is practically no difference in resistance to impact when these steels are in the annealed condition." This is the only comment he has to make on the tests of the steels below the freezing point of water, his interest evidently being greater in the behavior of the steels at high temperatures. Luckily, however, he presents data sufficient to show the conditions at lower temperatures, and we have, therefore, replotted the curve to a scale which emphasizes the conditions below freezing. An xamination of thse curves shows three things quite clearly:—

First—The .83 per cent high carbon steel shows little or no difference in resistance to impact between the annealed and the heat treated conditions, its value being low in both and varying but little with change in temperature. To us, this is of more or less academic interest only as this character of steel would not normally be used in railway equipment.

Second—The medium .36 per cent carbon steel is of a composition that makes it fall well within the axle class. Its tensile properties in the annealed state and when heat treated, were as follows:

	Yield point, lb. per sq. in.	Tensile strength, lb. per sq. in.	Elongation in 2 in., per cent	Reduction in area
Annealed	35,500	71,500	25.6	39.2
Heat treated.....	47,500	81,650	26.0	60.6

The 0.17 per cent carbon steel, which coincides with the .36 per cent curve until it passes + 25 deg. F. and then rises, although somewhat soft, may also be used by some for axles. In the annealed state, the resistance to impact of both the .17 per cent carbon steel and the .36 per cent steel are very low, but it is significant that the value stays nearly even between 60 deg. F. and 50 deg. F. Heat treating these steels apparently greatly increases their resistance to impact, being at 60 deg. F. some 20 times as great as in the annealed state. But with these steels in the heat treated condition, temperature changes have a marked effect. Calling the resistance 100 per cent at 60 deg. F., the relative values are:

Temp. deg. F.	0.17 per cent carbon	0.36 per cent carbon
+60	100	100
+32	94	95
0	76	85
—25	42	68
—50	24	35

It should be noted that even the reduced values of the heat treated materials at low temperatures are higher than any of the values, hot or cold, of the plain annealed materials. It would be interesting to ascertain whether future tests will bear out the figures given above and to have a study made of the causes of the change in value.

A special committee of the American Society for Testing Materials is studying the effects of temperature changes on the resistance of steel to impact and the hope is expressed that in considering the major subject of high temperatures, they will not overlook the lesser but important subject of low atmospheric temperatures. It would seem that the railroads might supply service data which would serve to amplify the committee's laboratory experiments.

In conclusion, we believe that it may be safely stated that cold weather does not cause crystallization, meaning thereby a permanent change in the crystalline structure. The same steels which showed a lessened resistance to impact at the low temperatures would undoubtedly regain their original properties when warmed again. It further appears that a proper heat treatment increases the resistance, but if in the design advantage has been taken of the increased tensile properties to reduce the diameter, thereby increasing the working stress, it is entirely possible that low temperatures may cause failure. These facts should, therefore, be taken into consideration in the design.

The available data is so meagre as to make it only possible in this article to point out the situation and express the hope that the subject may be carried further by those in a position to do so.

Florida East Coast Installs Signals

Alternating current color-light type are spaced about 8,500 *ft. on double track line*

By W. A. Hoffman
Superintendent of Signals, Florida East Coast, St. Augustine, Fla.

Standard Single Location

Typical Double Location on Double Track

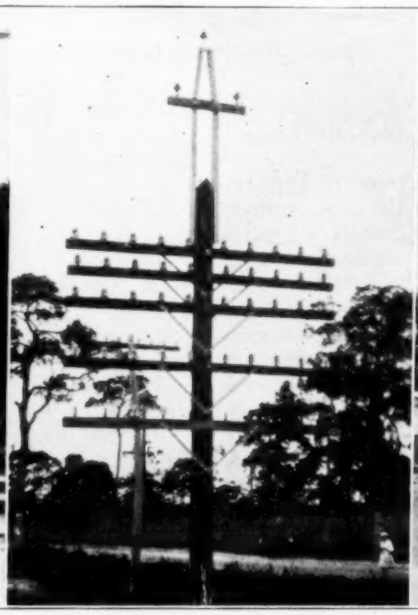
Signal at End of Passing Track

As part of the extensive program of reconstruction which the Florida East Coast has been conducting in keeping with the rapid development of the territory it serves, an automatic block signal system, several interlocking plants and automatic highway crossing protection have been installed between Jacksonville, Fla., and Miami. Other roadway improvements in this section of line calling for large expenditures include the rebuilding and double tracking of the main line south to Miami, the laying of 90-lb. A.R.A. rail, the rebuilding of bridges to handle heavier equipment, the rebuilding of stations and the enlargement of yards and terminals. It is planned to complete the double track work this year and with it the block signal system, the aim being to make this section of road one of the fastest lines in the country. The signals are track circuit controlled entirely (wireless) and are the alternating current three-indication color-light type manufactured by the General Railway Signal Company.

Eight Substations with Full Automatic Control Insure Continuity of Power

Between Jacksonville and Miami, a 3-phase 60-cycle power line is being constructed which will receive energy from eight substations distributed over this territory. The conductors are arranged in triangular formation,

Flashing Light Highway Signal



Brackets on Joint Poles

Traffic Light Crossing Signal

No. 4 B. & S. gage stranded aluminum wire with steel core being used. Between Jacksonville and Daytona Beach, a distance of 91 miles, the line voltage is 4,400, while south of Daytona Beach to Miami, a distance of 256 miles, the line voltage is 2,200.

The substations are arranged with full automatic control panels which operate to cut-in the reserve source of power at the other end of the line if the normal supply should fail or any of the line switches be opened. If a short circuit develops on the line the automatic control opens the circuit for a few seconds and then closes it, this process taking place automatically until the cross is burnt through or removed from the line, the switches opened, or the lock-out relay opened. After the line is cleared and the lock-out relay reset the stations at both ends of the line cut in automatically, keeping the signals working up to the location of the trouble. After trouble has been removed and line switches closed, one station cuts out automatically and the other takes up the normal load, depending upon the time adjustment at the substation. The transformers are of 25 kva. capacity connected in delta formation with one spare for emergency. All power equipment is manufactured by the Westinghouse Electric & Manufacturing Company, and housed in brick substation buildings which are finished to match surrounding structures.

In order to prevent inductive interference to adjacent parallel telegraph and telephone lines the high voltage wires are transposed every mile, making a complete barrel transposition every three miles. Sectionalizing switches are provided every six miles. Between Jacksonville and Bunnell, a distance of 67 miles, the high voltage wires are located on a separate pole line; between Bunnell and Jupiter, a distance of 197 miles they are placed above the Postal Telegraph Company's wires on a joint pole line and between Jupiter and Miami, a distance of 83 miles, the high voltage wires are place above the American Telephone & Telegraph Company's wires. These pole lines have been purchased by the railroad and although used jointly they are the property of the railroad.

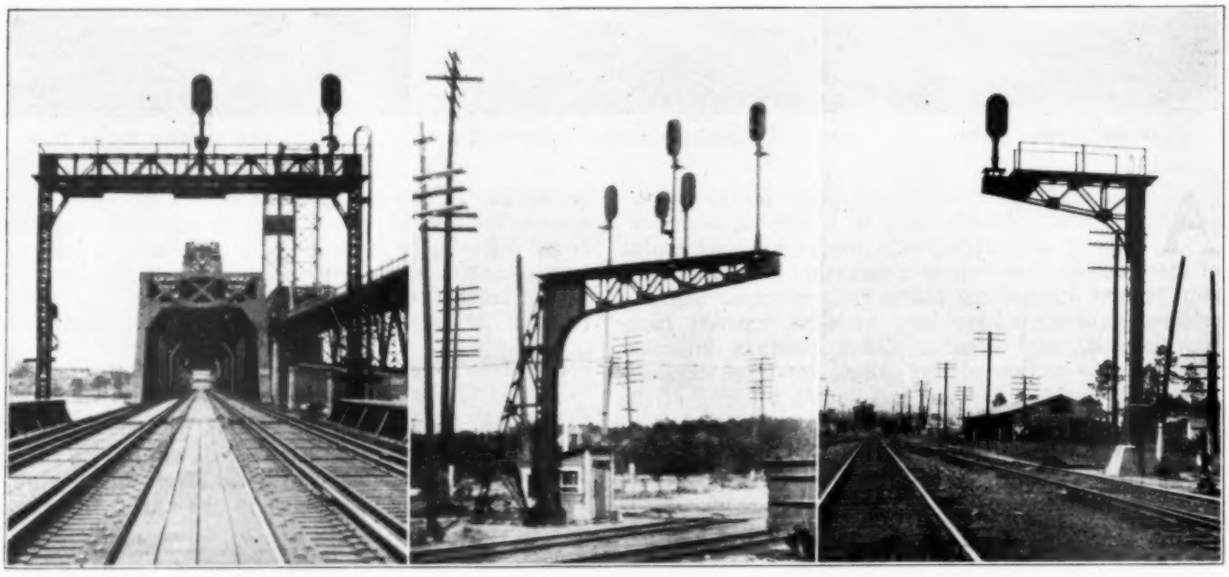
At each single and double signal location a 0.6-kva. line transformer is mounted on the pole which reduces the voltage to 110. These transformer poles are equipped with disconnecting switches, choke coils and lightning arresters to protect the transformer and signal apparatus.

Uniform Signal Indication System for Both Automatics and Interlockings

Signals are spaced approximately 8,500 ft. apart with continuous track circuits for each block, and as there are only a few curves and very little grade to contend with, under normal conditions it is not uncommon to see two signals ahead from the same location in daylight, although the normal rated range for these signals is 5,000 ft. The signals are equipped with 8-volt, 18-watt double filament lamps. The center of the red lens is set 15 ft. above the base of the rail except when conditions require higher poles on account of obstructions. At the leaving ends of passing tracks the side track is swung out to provide a location and proper clearance for the signal which is located 253 ft. back of the switch point. In crowded sections where it is not possible to swing the side track these signals are located ahead of the switch point.

All drawbridges in automatic block signal territory are provided with complete electric interlockers and connected with the automatic block system. The signal indications given at interlocking plants are of the same type as used for the automatics, making a complete color-light signal system from one end of the line to the other with one type of signaling.

The continuous full insulated rail joint of the Rail Joint Company is used throughout. All facing point switches have an insulated joint located at the first joint ahead of the switch with the circuit arranged to both shunt and break the track circuit when the switch point is opened 3-16 in. or more; all trailing switches shunt the track circuit when opened 1-4 in. or more. With this protection it was possible to remove switch lights and targets from all switches which are located less than 500 ft. beyond the signal.



Signals at a Drawbridge Interlocking *Cantilever Signal Bridge for Automatics* *Another Type of Cantilever Bridge*

Construction Methods and Maintenance Personnel

The material for the job was loaded on a work train with tank car and material cars, each carrying certain classes of materials. A concrete mixer was placed on a

flat car in the same train and concrete was mixed and foundations poured while material was being set off from the material cars, the holes being dug and forms set several days in advance of the train. The relay cases were wired at the factory of the signal company and were sent to the job complete with relays, transformers and tagging in place.

The automatic block territory is divided into sections of about 25 to 30 miles of double-track road, depending upon the number of operating units, each assigned to a signal maintainer and an assistant. These maintainers are furnished with a complete set of tools and a well built house for sheltering the motor car and a place to store maintenance material. At one end of the house a small office is provided with a desk and bench, in which the maintainer makes his reports and keeps his records. Each maintainer is furnished a Fairbanks-Morse "Sheffield No. 41" center load motor car.

The territory between Jacksonville and Miami is covered by two signal supervisors, one having charge of the north end of the road and the other the south end. The signal maintainers report direct to the supervisors who are responsible for the maintenance work done by these men. The storehouse at which all signal material is received and distributed is located at St. Augustine, Fla., 37 miles from Jacksonville. A storekeeper with a helper has charge of the material received and distributed to the men as needed and a careful record is kept of the distribution of materials used by the construction forces. Two floating gangs are provided, each having a foreman and about 12 men who are furnished with a complete camp outfit of bunk cars, dining car, kitchen car and tool car.

A.R.A. Form 11 is used by the enginemen to report delays which may be caused by a signal, the maintainer being notified and a report sent to the superintendent of signals. The maintainer also makes a daily report to the signal supervisor on A.R.A. Form 21 which gives the causes of train delays at signals on his section, enabling a complete performance record to be kept in the office of the superintendent of signals. Monthly reports are made out to show the comparative signal performance on each maintainer's section.

The signal system was designed under the direction of W. J. Eck, superintendent of the signal and electrical department of the Southern, who has been retained as consulting engineer for this work.

S. A. & A. P. Line Into Rio Grande Valley Authorized

WASHINGTON, D. C.

THE San Antonio & Aransas Pass, a subsidiary of the Southern Pacific, was authorized by the Interstate Commerce Commission, in a decision made public on July 22, to construct an extension of its line beginning at Falfurrias, Tex., and extending in a generally southerly direction to the Mexican boundary line at a practicable crossing of the Rio Grande, 84 miles; also a line connecting with it at Edinburg, Tex., and extending in a generally easterly and southeasterly direction to or near Harlingen, Tex., 30 miles. The decision was granted over the protest of the Missouri Pacific, whose Gulf Coast Lines now serve the lower Rio Grande Valley, and in spite of the challenge of the commision's jurisdiction by the Texas state authorities, on the ground that the extension had already been authorized by the Texas legislature, although the Texas authorities favored the line. Commissioner Woodlock had submitted a proposed report recommending denial of the application on the ground that the territory was already adequately served by the Missouri Pacific and that the traffic is not sufficient for two lines. He filed a dissenting opinion on the same grounds and was joined by Commissioners Hall and Meyer.

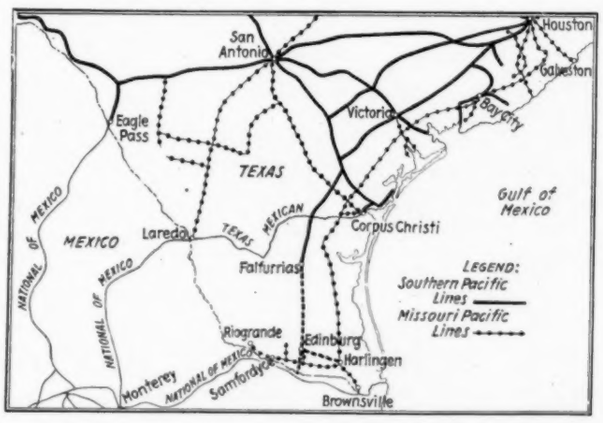
It is planned to begin construction of the Falfurrias line within 30 days after receiving authority therefor, and to complete it within 18 months after commencing the work. The Edinburg branch would be commenced within six months after the Falfurrias line reached Edinburg, and completed within 18 months after construction is begun.

The commission in its report says:

It is undesirable if not impossible to lay down any general rule by which it can be determined whether or not certificates of public convenience and necessity should be issued for the construction of proposed new lines of railroad. Every case must be decided in the light of its own special circumstances. As we see it, the salient features of this case are as follows:

Salient Features of This Case

1. The entire territory east of Eagle Pass and south of the Southern Pacific, which is approximately as large as the State of



Map Showing Location of Proposed Extension of Southern Pacific Into the Rio Grande Valley

Louisiana, is served almost exclusively by the Missouri Pacific, and it practically controls all of the crossings into Mexico east of Eagle Pass, being the only large system reaching those crossings.

2. The construction is proposed by an existing railroad system, one of the largest in the country, with a most excellent record of efficiency and prosperous operation and with financial resources that without question are much more than ample for the construction of the new line and for its maintenance and for the furnishing of good service after it has been constructed.

3. The project is not a new one but merely the resurrection and completion of a project inaugurated some 20 years ago, partially carried out, but never finished. It involves merely the extension of a line of railroad which now ends at Falfurrias, a little settlement which obviously was never intended as the terminus of even a branch line of railroad. The proposed construction will make it possible to operate with much greater advantage to all concerned in this existing line of railroad.

4. The proposed construction is simple, easy, and relatively inexpensive. The addition to the railroad investment in the western group, or in the southwestern portion thereof, or even in Texas, will be comparatively insignificant.

5. For the greater part of the distance the proposed extension will be through undeveloped territory 20 to 30 miles distant from any other line of railroad. While this territory is apparently not capable of great development, it will be able to produce a substantial amount of traffic, and it is possible that it may produce more than is generally anticipated. The conflicting evidence on this point makes confident predictions difficult.

6. The proposed extension will make possible a traffic connection between the Southern Pacific System and the Mexican

railways which can in the future be realized, if need be, at relatively small expense. While there is no assurance of such a connection and construction of the new line for this purpose alone would clearly be unwarranted, the possibility thus afforded for traffic interchange is entitled to consideration. It should be borne in mind that the Missouri Pacific now practically controls the only existing gateways into Mexico between Eagle Pass and the seaboard.

Great Possibilities of Rio Grande Valley

7. While at present the Valley seems on the whole to be very well served by the Missouri Pacific System, the agricultural possibilities of the Valley are very great indeed. There are very few districts in the country which can compare with it in this respect. While the present development is extensive, no more than a beginning has been made.

8. The traffic which the Valley produces requires the best freight and refrigeration service that can be furnished. It is of the utmost importance to the growers that they should be able to reach all important markets with maximum expedition, with minimum danger of serious interruption of traffic, and with a service sufficiently flexible so that they can readily protect themselves against or take advantage of shifts in marketing conditions. Competition in fruits and vegetables is so keen and markets are so easily overstocked that the latter consideration is of particular importance.

9. The Valley is now dependent upon a single-track line of railroad constructed along the Gulf coast and subject, as past experience has clearly shown, to the danger of interruption of service by storms and floods. The proposed new line of railroad would afford important and valuable insurance against such possible interruptions which does not now exist.

10. The Gulf Coast Lines system which operated this line of railroad prior to its absorption into the Missouri Pacific system had become a highly profitable railroad system, as witness the price paid by the Missouri Pacific for its stock. *Control of Gulf Coast Lines by M. P. R. R.*, 94 I. C. C. 191. It had attained this degree of prosperity prior to even the present development of the Valley as a source of traffic. In view of the development which is in process in the Valley, to say nothing of that which is possible, and in view of the advantages which the Missouri Pacific will possess in the Valley even if the new line is constructed, by reason of the extensive ramifications of its lines within the irrigated district, it is most unlikely that the new line will seriously impair the earning capacity of that portion of the Missouri Pacific system which was formerly operated by the Gulf Coast Lines.

11. The Southern Pacific system has not only ample financial resources for the construction of the new line and its maintenance in the future, but it is admirably equipped, both in facilities and by experience, for the handling of perishable traffic in fruits and vegetables.

12. The sentiment in the Valley and in Texas is overwhelmingly in favor of the proposed construction. While this fact should be discounted, inasmuch as public sentiment almost invariably favors new railroad construction even when clearly unwarranted, it is nevertheless entitled to weight. In some substantial measure it is based on experience of benefits to be derived from the competition of rival railroad systems of demonstrated strength and efficiency.

13. The growth and development of the Valley depends upon the ability of its producers to market their products. The construction proposed will afford shippers an additional supply of refrigerator equipment, will give them the benefits of competitive service, and will enable them to ultilize the wide distribution facilities of the Southern Pacific System with a one-line haul. It will also aid in the development of a large territory south of Falfurrias now remote from rail transportation.

14. The construction of the new line is supported by our decisions in analogous situations, some of them closely analogous. *Construction of Lines by Florida Western & Northern R. R.*, 90 I. C. C. 221; *Construction by Florida Western & Northern R. R.*, 90 I. C. C. 528; *Proposed Extension by C., R. I. & P. Ry. Co.*, 99 I. C. C. 473; *Acquisition and Construction by Alameda Belt Line*, 105 I. C. C. 349; *Construction of Lines in Eastern Oregon*, 111 I. C. C. 3. The last two cases involved the entry of rivals into fields theretofore exclusively served by the Southern Pacific, and the first two cases involved closely parallel construction by a competing railroad into territory analogous to the Valley and already served by two other railroad systems.

Upon the facts presented we find that the present and future public convenience and necessity require the construction by the applicant (1) of an extension of its line of railroad beginning at or near the present terminus of its Falfurrias branch at or near the town of Falfurrias, Tex., and extending in a general southerly direction through Brooks and Hidalgo Counties, Tex., to the international boundary line between the United States and Mexico at a practicable crossing of the Rio Grande; and (2) of a branch line of railroad extending from a connection with the line above described at or near Edinburg, Hidalgo County, in a general easterly and southeasterly direction to a point at or near Harlingen, Cameron County, Tex., as described in the applications. In our opinion the matters of record do not justify the grant of permission to retain excess earnings and such requests will be denied. An appropriate certificate and order will be issued.

Commissioner Woodlock Dissents

Commissioner Woodlock, in his dissenting opinion, said in part:

One of the chief reasons for approving the acquisition of the Gulf Coast Lines by the Missouri Pacific was the mutual strengthening of the two systems through the traffic to and from the Rio Grande Valley. The granting of this application tends to undo what was there accomplished. Present developments in the valley do not justify what the majority have authorized.

We are dealing here with a district rather definitely limited in extent, already cultivated intensively as to three quarters of its area, in which there is one mile of railroad to each 4.85 miles of area, with more than 90 per cent of the total area within 5 miles of railroad service, with railroad loading station capacity ten times the maximum carload shipments in any one day, with service admittedly excellent and with a demonstrated present service capacity equal to four times the maximum business heretofore handled. Yet we permit construction of another railroad to tap this territory, building, in order to do so, some 60 miles of road which admittedly cannot generate enough business in the territory traversed to support this mileage, and must depend for its support upon business derived from the Valley, which business must in the nature of things, largely come by diversion of traffic from existing lines. I cannot regard this action as being in accord with either the letter or the spirit of the law.

Diesel-Electric Locomotive Built in Russia

A DIESEL-ELECTRIC locomotive weighing 198 tons, including fuel and water, driven by a 1,000 hp. engine has recently been built and placed in service in Russia. The locomotive has 10 driving and two guiding axles. The engine used is a Vickers engine built in 1916, which was taken from a dismantled submarine boat. It is a four cycle, non-reversible, 10 cylinder engine with a rating of 1,030 hp. at 395 r.p.m., without an air compressor, using solar oil with mechanical atomizing. The engine drives two "Volt's" generators, each having a continuous rating of 380 volts and 1,500 amperes. At starting and low speeds these generators are connected in parallel and at higher speeds they are connected in series. There are 10 traction motors, permanently connected in parallel, spring mounted at one end, each one being geared to a driving axle through gears having a ratio of 1 to 4,625.

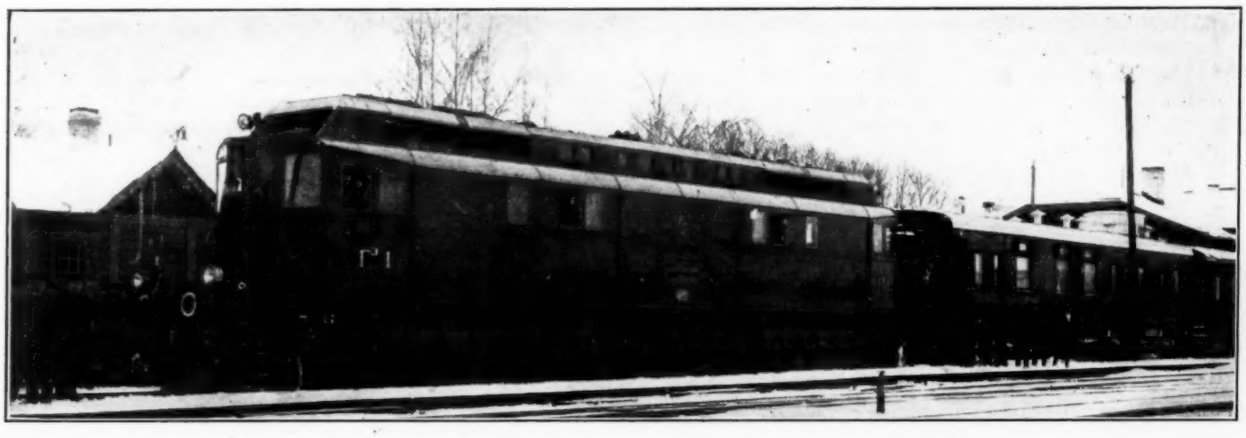
The motors are self-ventilated and have a one-piece steel frame with armatures mounted on S.K.F. roller bearings. The motors were built in Russia by the Electric Works formerly known as Deka. The locomotive is used to haul an 1,100-ton train at speeds up to 31 miles an hour and is designed to operate at a maximum speed of 47 miles an hour.

The generating apparatus is located in the single cab. The frame consists of two longitudinal riveted girders 35.5 in. in height at the center. The engine is installed on cast steel cross pieces and the generators are supported directly by bed girders. These girders are provided on the outside with cast brackets which support tanks for 7.7 tons of fuel oil and 1.1 ton of lubricating oil and a 600-ampere hour, 10-volt storage battery. The engine is started by using one of the generators as

a motor and the battery is also used for lighting and for the operation of auxiliary motors and control apparatus.

In two diametrically opposite corners over the floor, are two cisterns of cooling water of 1.65 tons capacity each and in the other two corners are a centrifugal circulating pump, a motor driven compressor for the Westinghouse brakes and a boiler, for supplying steam heat for the locomotive during long stops. There is a superstructure on the roof of the cab in which are located radiators having a surface of about 7,500 square feet. Air is drawn in through the radiators by fans driven from the engine through a belt and spur gearing. There are operating compartments at both ends of the cab.

The running gear of the locomotive consists of three trucks, the center truck having four driving axles and each of the end trucks having three driving axles and one guiding axle.



The 1000-hp. Diesel Electric Locomotive in Passenger Service

The frame is raised 17¾ in. over the trucks, thus leaving an open space for access to the motors, and is supported by 12 springs; four for each truck. The trucks are interconnected by rigid couplings so that tractive force is not transmitted through the cab frame.

The locomotive was designed by and built under the supervision of Prof. J. M. Haekel.

Argument on Building New Lines in Texas

WASHINGTON, D. C.

ORAL arguments were heard by the Interstate Commerce Commission on July 19 on the applications of four railroads to build new lines through the South Plains district of Texas, on which Examiner C. E. Boles and Engineer-Examiner E. Gray had submitted a proposed report favoring the granting of the application of the Texas, Panhandle & Gulf, an independent new company, over the others, subject to several conditions. The other applications were those of the Pecos & Northern Texas, a subsidiary of the Atchison, Topeka & Santa Fe; the Fort Worth & Denver South Plains, a subsidiary of the Fort Worth & Denver City; and the Quanah, Acme & Pacific, a subsidiary of the St. Louis-San Francisco. The examiners had recommended a certificate for the T. P. & G., for a line between Seymour, Tex., and Tucumcari, N. M., on condition that arrangements be made, if possible, for trackage rights covering part of the distance, that the company acquire the Gulf, Texas & Western, and that control of the applicant be acquired within six months by a major system other than the Santa Fe or Burlington. They expressed doubt as to the ability of the applicant to finance the project. They also recommended certificates for the other roads conditioned on the failure of the T. P. & G., to make the arrangements suggested in six months.

Luther M. Walter, who appeared for the Texas, Panhandle & Gulf, asked for a longer time than six months, urged that the exception as to the Santa Fe and Burlington be omitted, and that the conditions be so framed as to permit the company to build all the way to Forth Worth if it could not obtain trackage rights.

Elmer Westlake, appearing for the Santa Fe subsidiary, criticised the examiner's report as being based on too many "if's," "but's" and provisos. He said the South Plains section had been adequately served by the Santa Fe in the past and that its proposed lines would serve the needs of shippers for years to come, and at considerably less expense than that of the Burlington project. If the time should come when a direct line from the South Plains section to Wichita Falls, Fort Worth and Dallas should be required, he said, the Santa Fe stood ready to construct such a line by a more direct route than any suggested by the examiner.

J. H. Barwise, who appeared for the Fort Worth & Denver South Plains, said that the South Plains section not only needs more railroad mileage itself but that it needs direct lines to Fort Worth, Dallas and Wichita Falls and that the Santa Fe lines were located not with relation to the commercial needs of Texas but with relation to large cities outside of Texas. He said the Texas, Panhandle & Gulf was nothing but a "paper survey" and that it "could not finance ten miles of railroad if it had twelve permits," but desired a "franchise to be sold to the highest bidder."

C. H. Smith, representing the Quanah, Acme & Pacific, spoke on behalf of its application for a line from Mac Bain to Floydada, which the examiner had recommended should be turned over to the Texas, Panhandle & Gulf. He said the latter had not indicated a desire to buy and that his company was not proposing to go out of the railroad business.

While its proposed line might not be profitable itself it would develop traffic for the entire Frisco system, and the company stood ready to extend its line ultimately from Floydada to Lubbock.

Bus and Truck Investigation Opens at Chicago

Railways, motor vehicle operators and shippers in middle west describe present status of highway transportation

THE Interstate Commerce Commission began on July 27 in Chicago its investigation No. 18,300, "into and concerning the operation of motor buses and motor trucks by or in connection or competition with common carriers subject to the interstate commerce act." Commissioner Esch and Examiner Flynn presided at the hearing which was attended by an overflow crowd of railway officers, owners of bus and truck lines, motor vehicle manufacturers and shippers.

The order of procedure during the three-day hearing at Chicago provided for the appearance of representatives of the railways on the first day, representatives of the bus and truck operators on the second day, and representatives of shippers on the last day. Commissioner Esch announced in reading the call of the hearing that no argument would be permitted on points raised, but that these should be advanced in briefs which may be filed with the commission by all interested parties until October 10.

P. S. Eustis, passenger traffic manager of the Chicago, Burlington & Quincy, was the first railroad witness. He testified that the Burlington has made no arrangement with bus lines for through ticketing of passengers except in one instance in the Black Hills. In this case an independent bus line carries passengers, baggage and express for the railroad, the railroad providing station facilities. Bus and truck competition along the lines of the Burlington is general, almost none of the bus service being supplementary to the railroad service. Some portion of the bus and truck business is of an interstate character, but the larger part is of an intrastate nature.

In reply to a question by Commissioner Esch, Mr. Eustis said that there had been only one instance of an abandonment of a line due to bus competition, that being in the Black Hills. A certain amount of train service has been withdrawn, he said, but the railway has not been entirely successful in reducing its service due to the objections of patrons who wanted to retain the train service for use on rainy days or under other circumstances when travel by highway might be unpleasant, or on account of civic pride in having train service. The Burlington is now taking such steps as it can, first, to reduce the cost of the provision of service on its rails, and second, to abandon lines where the passenger traffic has so decreased as to remove the necessity for their continuation.

Conditions in Indiana

C. L. Henry, of the Indianapolis & Cincinnati Traction Company, testified regarding transportation conditions in Indiana, since the advent of the bus and the truck. In southern Indiana, he said, there are some ten bus lines in the territory between Indianapolis and Cincinnati. The Indiana Public Service Commission, he said, has paid little attention, in acting upon applications for certificates to operate bus and truck lines, to the effect on the business of established carriers of the highway competition, this being due in part to the only recent enactment of legislation giving the commission jurisdiction over the bus and truck carriers. Bus and truck operators who had been in business prior to the passage of the legislation were given certificates automatically.

F. D. Norveil, general freight and passenger agent of the Union Traction Company of Indiana testified that there are 40 licensed bus and truck lines in the territory served by his company and a much larger number of "wildcats." The trucks, he said, handle high class freight only and the truck lines frequently load their trucks far beyond the legal limit. Two-ton trucks are frequently loaded with as much as five tons of freight.

C. W. Chase, vice president of the Chicago, South Shore & South Bend and president of the South Shore Motor Coach Company, said that his company had organized the bus line to operate between Benton Harbor, Mich., and Chicago, in order to protect its business which was being lost to a number of bus lines operating between Indiana cities and Chicago. The South Shore Motor Coach line now has 125 coaches operating over 200 miles of route. The gross annual revenue of the bus lines in his territory he estimated at $2,000,000, saying that this represented the loss to the railroads through the bus competition. Between northern Indiana cities and Chicago there are 11 bus lines and ten truck lines. None of these have certificates to operate in the state of Illinois although some have certificates in Indiana.

Since the public demands motor bus service, said Mr. Chase, it should be provided. But this should be done by established carriers rather than by newcomers in the transportation field. This should be the case, he said, since only the established carriers can offer the co-ordinated service demanded by the best form of transportation. There is little hope of the railways winning back the business they have lost through their rail lines, Mr. Chase thought, since the recent expenditure by his company of $3,000,000 for new railway equipment has not reduced the rate of the decline in business on the line.

The plans of the Chicago & Alton to recoup its losses in passenger traffic to the private automobile and the motor bus by operation on its own part of highway vehicles were described by George J. Charlton, passenger traffic manager of the railway. The Alton's losses to highway passenger carriers have been severe, he said. For example the number of tickets sold at Normal, Ill., declined from 1,700 to 837 during the period from 1921 to 1924, and at Towanda, the number of tickets sold declined from 700 to 182. These representing the sales of tickets during the month of June for the years mentioned. In one district he said the Alton sold 5,390 tickets a month before bus competition began, this number declining to 2,567 after operation of buses commenced. Passenger business of the Alton this year is approximately 15 per cent less than it was in 1921.

In order to provide the service apparently desired by the public the Alton expects shortly, Mr. Charlton said, to supplement its train service with bus service on two portions of its line—one from Joliet, Ill., to Springfield,

and the other from Jacksonville, Ill., to St. Louis, Mo. Applications before the Illinois Commerce Commission for certificates permitting such bus operations are now pending, he said.

G. W. Welch, vice-president of the East St. Louis & Suburban, testified that his company now operates 28 buses supplementing the train service on its 150 miles of line.

Charles H. Thompson, vice-president of the Chicago, North Shore & Milwaukee, stated that his company began the operation of buses three years ago when it anticipated future losses from bus competition. The 47 buses owned by the North Shore Line are owned by the railway and the operation is conducted directly by it. The bus lines up to the present time have been operated at a loss but it has been felt that the business brought to the rail line by the buses has more than made this up, Mr. Thompson said. The North Shore Line conducts no truck operations for the carriage of freight except in its terminals, where a pickup and delivery service is provided in connection with its package car freight service on the railway.

Coupon tickets for through transportation by rail and bus are sold by North Shore Line agents, Mr. Thompson said. Although separate accounts of the rail lines and bus lines are kept for the information of the company, losses sustained in the bus operation have been taken from the railroad revenue and similarly the salaries and wages of the employees on the bus lines are paid by the railroad. Rates for transportation in the buses is generally 10 per cent higher than corresponding rail rates.

Bus Operators Show Demand for Bus Service

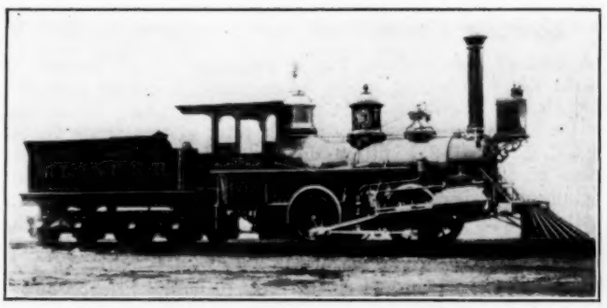
On Wednesday, following completion of testimony by the railways, the operators of buses and trucks were given an opportunity to testify regarding their business and the demands for the service they provide. H. E. Barber, president of the Egyptian Transportation Company, one of the largest bus operators in the middle west which conducts an extensive highway passenger service in southern Illinois, stated that the reason for the popularity of the buses, entirely aside from their convenience and comfort, has been the fact that there has been no improvement in train service in recent years. He held that the operation of local trains by the railways is a mistake. The carriage of local passengers is a task requiring low volume, low speed carriers and this demand is met by the motor bus, Mr. Barber said. In many instances he declared buses make faster time over a given route than do local passenger trains. The place for the train is the high speed, large volume transportation of passengers; for the bus, low speed, low volume transportation. He held that railways should cease to operate wherever possible their so-called local trains, replacing them by the high speed through trains stopping only at principal points; the carriage of passengers and express between the principal points being carried on by buses feeding to the through trains. In general, he said, where trains can be operated at a profit the bus is not justified. Mr. Barber mentioned specifically a local train covering a route 220 miles long and requiring 10 hours to traverse it. Train service on this line he contended should be speeded up through the elimination of stops at local points until the running time was approximately four or five hours, and the installation of buses to handle the business of the local points where the trains do not stop, connections with through trains being provided at principal points. The bus, said Mr. Barber, cannot handle long haul business economically. He put the maximum length of economic bus haul at approximately 150 miles and said that this would be reduced if train service were speeded up. Mr. Barber favored regulation of motor bus operations strongly. He held that it is necessary to prevent the mistakes that bus operators are making constantly today, which result in their ultimate failure. Such regulation, he said, should be carried on by state regulatory bodies on account of the local nature of the bus business.

Testimony to the effect that it is the private automobile rather than the motor bus that is cutting into the railways, passenger revenues was given by several other witnesses during the day. Chester G. Moore, executive vice-president of the Illinois Motor Transportation Association, said that while the loss in passenger revenue by the railways in Illinois from 1920 to 1925 had exceeded $9,000,000, interstate buses did a business only 20 per cent that large. Referring to the present regulation of motor buses in Illinois, Mr. Moore said that the law requires that buses must carry a minimum insurance of $10,000 for one person and $10,000 for one accident. Approving the principle of regulation of motor buses, Mr. Moore considered the best method would be for interstate bus line to be regulated jointly by the utilities commissions of the states they serve with provision for the taking of cases in which disagreement arose to the Interstate Commerce Commission.

H. T. Kelting of Louisville, Ky., president of the Motor Truck Company of Kentucky, argued that federal regulation of motor trucking at this time would strangle a growing industry. He testified that unregulated trucking had done more to develop Kentucky than any other factor.

J. D. Landis, secretary of the Ohio Truck Owners Association, bitterly assailed the present method of bus and truck regulation under existing laws in the state of Ohio. The severity of the law, he said, is handicapping the development of truck transportation. He questioned whether motor truck transportation can ever be regulated satisfactorily on account of the special service nature of the truck. Mr. Landis held that the truck's natural place is that of a feeder and distributor to and from the railways. Shippers who ship by truck for a distance of more than 50 miles Mr. Landis said must pay more for truck transportation than for rail transportation over the same distance. The fact that shippers are frequently willing to pay the extra charge for such service is evidence of the need for truck transportation, he concluded.

Representatives of the Bureau of Public Roads of the Department of Agriculture and of various shippers' organizations in the Middle West appeared before the commissioner and the examiner on Thursday. A report of their presentation will be published next week.



A St. Louis, Alton & Chicago (Now Chicago & Alton) Locomotive of the Early Days

General News Department

The Interstate Commerce Commission has postponed the effective date of its second automatic train control order in the case of the Louisville & Nashville and the Richmond, Fredericksburg & Potomac to January 1, 1927.

The Interstate Commerce Commission has postponed until January 1, 1927, the effective date of its first and second automatic train control orders as to the Pennsylvania, on petition of the company, dated July 21.

The United States Board of Mediation, which has been quartered temporarily in the office of the Department of Labor at Washington, has selected offices in the Earle building, Thirteenth and E streets, N. W., and will occupy them shortly.

The Interstate Commerce Commission has postponed the effective date of both its first and second automatic train control orders in the case of the Long Island to January 1, 1927. In the case of the Delaware & Hudson the commission has postponed the effective date of the second order to January 1 and in the case of the Reading the date has been postponed to December 31. The commission also modified its order as to the Reading to permit the installation to be made between Bethlehem and Jenkintown, Pa.

The thirteenth annual convention of the Texas-South West Railway Claim Agents Association met at Hot Springs, Ark., on July 8-10. Dallas, Tex., was selected as the place for the next meeting, which will be held in July, 1927. The following officers were elected: President, S. G. Seabrook, general claim agent, S. S. W. of Arkansas; first vice-president, James A. Jones, general claim agent, Fort Worth & Denver City; second vice-president, W. E. Davison, claim agent, Mo. P., Little Rock, Ark.; secretary, O. R. Carter, claim agent, M. K. T. of Texas.

The Philadelphia Rapid Transit passenger air service began operation between the Navy Yard at Philadelphia and Hoover Field, Washington, D. C., on July 16. Beginning July 20, planes leave Philadelphia at 9.30 a.m. and 1.45 p.m. and Washington at 12.00 noon and 3.30 p.m. The distance is 125 miles and the flying time is one hour and a half each way. The fare is $15 one-way—$25 for a 15-day round trip ticket. P. R. T. Air Service buses leave 237 South broad street in Philadelphia, 45 minutes before departure of planes, and Hotel Washington at Washington, 20 minutes before departure. Buses will also meet the planes on arrival.

Pullman Company Buys Shop Site at Atlanta, Ga.

The Pullman Company has purchased the 27-acre plant of the United States Cast Iron Pipe & Foundry Company, at Atlanta, Ga., and will use the property as a repair shop. New buildings will be constructed and old ones will be rebuilt to take care of the repairing of Pullman cars.

"Courtesy Contest" on the Southern Pacific

A total of 574 Southern Pacific employees on the company's Pacific Lines submitted papers in the courtesy contest recently conducted by The Bulletin, the employees' magazine. The prizes for the best essay on courtesy include three system grand prizes of $50, $25 and $10, fifteen division and general office first prizes of $5, five $2 prizes for each of the Los Angeles and Sacramento divisions, four $2 prizes for each of the Portland, Western, Coast and Salt Lake divisions, three $2 prizes for each of the Tucson and Rio Grande divisions and the general offices, two $2 prizes for each of the Shasta, San Joaquin, Stockton and New Mexico divisions, and one $2 prize for each of the Steamer and East Bay Electric divisions. Of the total number of essays written during the six weeks the contest was open, 167 came from employees holding clerical positions, 56 from agents, 51 from conductors and brakemen, 78 from station employees including telegraphers, ticket clerks, warehouse men, baggage men, men in gray and red caps, 34 from shopmen and 10 from section foremen. A total of 31 women submitted essays. The judges in the contest included W. J. Kerr, president of the Oregon Agricultural College; W. W. Campbell, president of the University of California; Cloyd H. Marvin, president of the University of Arizona; David S. Hill, president of the University of New Mexico; George Thomas, president of the University of Utah, and Maxwell Adams, vice-president of the University of Nevada.

L. C. Fritch an Honorary Member of the A. R. E. A.

The American Railway Engineering Association has conferred honorary membership on L. C. Fritch, vice-president operation, Chicago, Rock Island & Pacific, "in recognition of the invaluable service he rendered the association during its formulative stage and for his acknowledged eminence in railroad engineering and management." Mr. Fritch took a prominent part in the administration of the affairs of this association in its early years, serving as secretary from its organization in 1899 to 1903 and later as a member of the Board of Direction, vice-president and president.

C. N. R. Has Prosperous Half Year

An increase of $11,114,314, or 296 per cent, in net earnings for the six months of 1926 ending June 30, as compared with the same period last year, is shown in the financial statement of the Canadian National issued in Montreal this week.

This statement also shows the highest gross for any first half-year since consolidated system figures were set up in June, 1922, and the highest gross and net for any June since that time.

For the first six months' period ending June 30 in each year, net earnings and operating ratios were as follows:

	Net earnings	Operating ratio
1922	*$2,869,596	102.82
1923	1,591,357	98.63
1924	2,629,430	97.71
1925	3,742,346	96.45
1926	14,856,661	87.72

*Operating deficit first half of 1922.

East-Side Lines Required to Bear Transfer Expense at St. Louis

The "east-side" railroads reaching the Mississippi river at East St. Louis will be required after October 12 to bear or absorb the transfer charges of the Terminal Railroad Association of St. Louis on westbound freight traffic moving through St. Louis and East St. Louis on combination rates which are the same on St. Louis as on East St. Louis, according to a decision of the Interstate Commerce Commission made public on July 28, on a complaint filed by four of the important "west-side" lines, the St. Louis-San Francisco, the Missouri Pacific, the Missouri-Kansas-Texas and the Chicago, Rock Island & Pacific.

Reparation for the two-year period prior to February 5, 1925, asked by the west-side lines, was denied, and a careful study of the divisions of joint rates on westbound traffic through St. Louis and East St. Louis was commended to the interested carriers, with a view to a readjustment in conformity with the practice prescribed in respect of interchange switching. Heretofore the west-side lines have borne the transfer charges on practically all eastbound and westbound through traffic, but they asked the commission to condemn the present practice and award reparation for the past.

Chairman Eastman wrote a dissenting opinion, in which Commissioners Hall and Woodlock concurred, saying he was not persuaded that the "practice" complained of is within the commission's jurisdiction and expressing doubt as to whether the evidence was sufficient to justify the finding made.

Traffic News

The Mobile & Ohio on August 8 will place into service a new train to be known as the Gulf Coast Special, between St. Louis, Mo., and Mobile, Ala. The new train will carry sleeping cars, a parlor-observation car and a dining car.

The Chicago & Eastern Illinois, in conjunction with the Missouri Pacific, has inaugurated a daily package car service between Chicago and Memphis, Tenn. The car leaves Chicago at midnight and arrives at Memphis at 3 p. m. on the second day, thus affording third morning delivery.

The Kansos, Oklahoma & Gulf passenger and freight stations at Muskogee, Okla., were abandoned on July 17 and joint operation out of the Midland Valley station was begun. This was one of the final steps in the consolidation of the K., O. & G. and the Midland Valley, which has been under way for some time.

The Illinois Central, in conjunction with the Alabama & Vicksburg and the Vicksburg, Shreveport & Pacific, has inaugurated sleeping car service between Chicago and Shreveport, La., in connection with the Panama Limited. Cars leave Chicago at 12:30 p. m. daily, and arrive at Shreveport at 1:15 p. m. the next day. Returning, they leave Shreveport at 8:15 a. m. and arrive in Chicago at 9:30 a. m. the next day.

City Ordinance Prevents Ticket Scalping

A city ordinance has been passed at Columbus, Ohio, which prohibits the scalping or vending of railway tickets by scalpers, venders or brokers other than regularly authorized agents of railways. Under the ordinance, it is unlawful for any person, firm or corporation to engage in the sale of railway tickets or to solicit by signs or advertisements or in any manner the purchase or sale of reduced rate or special excursion railway tickets within the limits of the city.

Any person, firm or coporation violating any provision of the ordinance shall, upon conviction, be fined in any sum not less than $10 nor more than $25 and each day's violation shall constitute a separate offense.

Reply Brief in O'Fallon Case

Clark & La Roe, counsel for the St. Louis & O'Fallon and the Manufacturers' Railway, have filed with the Interstate Commerce Commission a reply to the 148-page brief submitted in the case involving the valuation of the two roads by Philip J. Doherty, attorney for the commission's Bureau of Valuation, in which he attacked the "cost of reproduction theory" of railway valuation and strongly advocated the "investment theory." Mr. Doherty was allowed to present an expression of his views in this case with the understanding that they were not binding on the Bureau.

"This is no time for excursions into the field of theoretical economic policies," the reply brief says. "This is neither the time nor the place to discuss the views of individual minds as to what, according to varying mental processes, the law ought to be. Whatever may be the facts with respect to the economic expediency of appraisal methods adopted by the commission, whether or not it is, in the opinion of the 'attorney,' economic folly to declare the true value of common carrier properties, legislative authority, acting within its legitimate sphere, has laid upon this commission, as its agency, the positive duty to 'ascertain and report in detail as to each piece of property . . . the cost of reproduction new, the cost of reproduction less depreciation, and an analysis of the methods by which these several costs are obtained, and the reason for their differences, if any.'

"More than thirteen years have elapsed since the valuation act was adopted and many millions of dollars have been spent in carrying out its provisions. If the cost of reproduction method of determining one of the most important elements of true value is 'economic folly' it seems strange that that fact has escaped the notice of the commission and the Congress. Under settled principles of constitutional law, and under the definite provision of the interstate commerce act, these respondents are entitled to a fair return on the true value of all their properties held for and used in the public service. The determination of that value must be in accord with established principles of existing law, regardless of individual opinions of what the law ought to be."

Improved Passenger Service on C. & O.

Improved passenger service on most through trains and some local trains will be inaugurated on August 1 by the Chesapeake & Ohio. Changes will quicken schedules over the entire system. Below are some of the new schedules:

No. 1. Leave Washington 6:55 p. m., Norfolk 4:15 p. m., Richmond 7:15 p. m., which is 15 minutes later at each point than at present. Same arrival at Cincinnati as at present.

No. 2 will leave Cincinnati at 12:40 p. m. (instead of 12:01 p. m.), shortening the schedule 30 minutes, arriving Washington same as at present, arriving Richmond 7:45 (instead of 7:30 a. m.). Departure from Louisville will be 9:25 a. m. (instead of 8:45 a. m.), and from Lexington 12:10 p. m.

No. 3 will leave Washington at 11:30 p. m., Richmond 11:30 p. m., which is 15 minutes later than present schedule, arriving Cincinnati 4:50 p. m., Louisville 7:55 p. m.

No. 5 will leave Washington at 3 p. m. (instead of 2 p. m.), leave Norfolk 12:01 noon (instead of 9 a. m.), leaving Richmond 2:50 p. m. (instead of 1:55 p. m.), arriving western termini same as at present. This gives Hampton Roads territory greatly quickened service to all western territory, the objectionable layover at Richmond being eliminated.

No. 46 will leave Clifton Forge 6:15 a. m., which is later than at present, giving a more convenient schedule at all mountain stations.

Connections between local trains and branch line trains are considerably improved and extensions of Pullman service provided.

Minor changes will be made in a number of other trains.

Motor Transport News

Motor bus and truck traffic on the highways in North Dakota has increased nearly 100 per cent in the last two and one-half years, according to figures compiled by the highway commission of that state. On July 1, 1923, when the railroad commission took over the regulation of bus and truck traffic, only 20 common carrier bus and truck operating companies were in existence, their combined route mileage being 1,046. At the end of 1925 there were 32 such carriers with a total route mileage of 2,021 miles.

The Chicago Traffic Club Hears Buses and Trucks Discussed

An open forum meeting on motor bus and truck transportation and regulation, preliminary to the Interstate Commerce Commission investigation of the subject, was held by the Traffic Club of Chicago in Chicago on July 22. A. E. McKinstry, vice-president of the International Harvester Company, Chicago, represented the manufacturers of bus and truck equipment and discussed the subject of "The Motor Transport Industry and the Public Interests." He enumerated the advantages offered by bus and truck transportation as compared with transportation by rail and said that there would be no competition between motor vehicle transportation and railway transportation if each would confine itself to the work for which it is best fitted. He urged that the intent of regulation of motor vehicles and common carriers should be to stimulate the growth of such transportation along economic lines rather than to strangle it.

T. C. Powell, president of the Chicago & Eastern Illinois, discussed the railroad attitude toward the regulation of buses and trucks. He described the present situation respecting taxation and regulation of the motor carriers and favored the adoption of the following principles of regulation: That bus and truck service should be subjected to the same scrutiny in the interests of safety and economy as now applied to rail transportation and development; that the responsibility of the highway carriers should be fixed so that any damages to persons or property may be promptly recovered; that as the highways are created and maintained through the expenditure of public money some portion of this expense should be paid directly by those who operate on such highways for profit; that certificates or licenses should be granted only to those able to guarantee safe, reliable and efficient service;

that the regulation should apply not only to those vehicles that operate between fixed termini but to others depending upon individual contracts; that in the collection of passenger fares and freight charges, both the railroads and the public should be protected against cut rates, rebates and unfair practices; that full hearings should be granted to all parties interested before a certificate is granted to a truck or bus operator; that motor routes should not be permitted when it can be shown that the existing rail transportation is adequate; that any certificate granted to a motor truck or motor bus to operate for hire should carry with it an obligation to maintain in all seasons a reliable, permanent and continuous operation.

New York Commission Regrets Lack of Adequate Bus Regulation

The Public Service Commission of New York granted a certificate for the operation of an independent bus line between Afton, N. Y., and Sidney as part of a route under operation between Binghamton and Afton for some time. No certificate for the Afton-Sidney part of the line was required until recently when Sidney and the town of Unadilla adopted the provisions of the Transportation Corporations Law requiring bus operators to get local consents. The bus operators presented the necessary consents on the hearing before the commission.

The Delaware & Hudson opposed the petition and presented evidence as to the existing train service between Afton and Sidney. In handing down its decision in favor of the bus line the commission said:

"The railroad is operated under very strict regulations and provides and maintains at its own expense a highly developed right of way. Trains are run both winter and summer and schedules are maintained with reasonable regularity. If an application was made to abandon certain of the through trains there is no doubt but the same witnesses who appear and urge the granting of the certificates for the operation of the motor bus line would appear to oppose the taking off of the trains, particularly in the winter time. These matters have been carefully considered by the commission and the attention of the legislature called to the lack of comprehensive motor bus legislation."

Apparently the commission feels it is without authority to protect the railroad company from competition unless specifically authorized so to do by legislative enactment.

Railway Facilities Adequate, Bus Needed Anyway, Says Electric Line

The International Bus Corporation of Buffalo has made application to the Public Service Commission of New York for a certificate authorizing the operation of a bus line between Buffalo and Niagara Falls under consents received from the municipalities through which the proposed bus line will pass. The petitioning company says:

"Although adequate service in the transportation of persons and property on interurban electric railroad cars and trains is being furnished to the public upon the interurban line known as the 'High Speed Line,' of the International Railway Company, there has come with the development of motor vehicle transportation by means of high class omnibuses a demand among certain classes of travelers for that kind of transportation, and in the opinion of the petitioner, there are a considerable number of persons who would prefer to patronize such an omnibus line and to pay for transportation thereon a fare greater than that now charged upon the interurban electric railroad line. It is the desire of your petitioner to fill this demand by the proposed operation. Inasmuch as the proposed omnibus and motor vehicle line and route will in a measure compete with the said High Speed Line of the International Railway Company, it is appropriate that these additional transportation facilities shall be furnished by your petitioner, which is a subsidiary corporation of the International Railway Company. The proposed omnibus line and motor vehicle line may also, in some measure, compete with the railroad line of the New York Central Railroad Company, although the different character of service to be rendered and the fact that the omnibuses will carry passengers directly, without transfer, to the territories through which the route will extend, will make such competition, if it exists at all, inconsiderable."

Commission and Court News

Interstate Commerce Commission

Increased rates on cream, milk and buttermilk, transported on passenger trains, to and from points in Montana, North Dakota, Minnesota and other northwestern states, proposed by the Great Northern, Northern Pacific and the Minneapolis, St. Paul & Sault Ste. Marie, have been found not justified by the Interstate Commerce Commission. Commissioner Hall dissented, saying that in his opinion the increased rates had been justified by facts and for reasons sufficiently set forth in the majority report.

The Interstate Commerce Commission has denied the petition of the Texas & Pacific Railway for more specific findings by way of interpretation of the commission's recent decision that there was no warrant for the assertion of its jurisdiction over the abandonment of the Midland & Northwestern Railway. The road is involved in litigation in Texas which revolves to some extent around the question of whether the road was legally abandoned as of a given date, before its acquisition by the Texas & Pacific. Operation of the line was abandoned in 1920.

The Interstate Commerce Commission on July 28 made public another decision, amounting to 44 mimeographed pages in the long-standing controversy involving rates and switching charges via the Peoria & Pekin Union, requiring connecting lines to establish joint rates in connection with that company to, from and via Peoria or East Peoria, Ill., on a basis of divisions prescribed. The commission also found not justified proposed charges for intermediate switching in the Peoria district and ordered cancelled the charge for intermediate switching between the Minneapolis & St. Louis and carriers in East Peoria.

Petroleum Rates to Be Investigated

Stating that formal complaints have been filed bringing into issue the rates on petroleum and petroleum products from producing fields and reshipping points into southern and official territories and between points in each of those territories; that these complaints do not bring into issue all points of origin or destination in those territories, or all related points of origin in the producing fields, the Interstate Commerce Commission has ordered an investigation on its own motion "into and concerning the interstate rates on petroleum and petroleum products within the territory on and east of the Mississippi river, and south of the Ohio river, and east of the Indiana-Illinois state line, and from points without to points within said territory, with a view to determining whether said rates are unreasonable or are unduly prejudicial to or unduly preferential of particular localities or persons and to making such order or orders as may be proper in the premises."

All common carriers subject to the interstate commerce act are made respondents to this proceeding.

I. C. C. Attorney Urges Investment As Basis of Valuation

Phillip J. Doherty, attorney for the Bureau of Valuation of the Interstate Commerce Commission, has submitted to the commission a brief and argument in support of the investment method of determining railroad value for rate-making purposes in which he vigorously attacks the reproduction theory of valuation which the railroad counsel have insisted the commission must at least take into consideration. The brief is one of several filed with the commission in connection with the test case involving the valuation of the St. Louis & O'Fallon.

"The reproduction theory of railroad and utility valuation is rationally indefensible; it is economically unsound," Mr. Doherty says in his brief. "It is enormously and wastefully costly. It is ascertained almost wholly by expert estimates dependent upon judgment of the expert estimator which judgment may not be tested by any reliable rule. It is variable from time to time by elements dehors the utility. Its variability requires constantly

repeated and never ending revaluation. It results in putting value for rate base in a continuous state of flux. It practically prevents any possibility of permanence in any prescribed schedule of rates. It is so uncertain in itself and as to its elements and limits that it will result in a never ending flood of litigation."

Mr. Doherty also contends that the valuation of all railroads on the basis of the examiner's report in this case, which was based on an estimate of the probable investment in the property, would produce ample fair return on their total capitalization.

"From 1924 Statistics of Railways in the United States it appears," Mr. Doherty says, "that the net book value of all railroads (treated as one system) was $22,801,332,000 in 1924. From the same Statistics of Railways in the United States it appears that the net capital stock of all railroads in the United States is $6,897,200,539, and that the actual requirement for net fixed charges in excess of non-operating income was $464,139,629. To pay all fixed charges and to pay 5¾ per cent ($396,589,031) on net capital stock, and to provide further and additional 5¾ per cent on net capital stock for additional dividend or for surplus, the railroads would need only a total net railway operating income of $1,257,317,691. This latter sum, capitalized at 5¾ per cent, equals a rate base of $21,800,000,000. The method proposed by the examiner would probably produce a rate base approximating the book value, although that figure represents a sum more than sufficient to pay all fixed charges and give an income of 11½ per cent on the then outstanding net capital stock for the railroads of the United States, treated as one system."

Personnel of Commissions

C. F. Staples, who has been acting director of the Bureau of Valuation of the Interstate Commerce Commission, with office at Washington, D. C., has been designated as director of the Bureau, effective on July 1.

State Commissions

Commission Extends Time for Electrification in New York

The Public Service Commission, acting under authority of legislation enacted in 1926 allowing it to extend for not more than five years the time within which steam railroads operating in New York City must electrify their lines, has acted upon the requests of four additional railroad corporations for extension of time, as follows:

New York Central—Yonkers Branch, Putnam division; time for compliance extended, nunc pro tunc, from January 1, 1926, to February 1, 1926. Main Line, Putnam division, including Saw Mill river branch, to January 1, 1930. Port Morris Branch and electric division sidings and yards, to July 1, 1927.

West side freight line between Spuyten Duyvil and 72nd street, to July 1, 1929, without prejudice, however, to the right of the New York Central to apply for a further extension upon sufficient reasons being shown. West Side freight line, between 72nd street and St. John's Park, or such other southerly terminal as may be provided and operated, to July 1, 1930, without prejudice to application for further extension of time on sufficient reasons being shown. Two Diesel locomotives have been ordered for the Putnam division, and will be in service in December next. The company desires to make tests and use the two locomotives for experimental operation before placing its entire order for that division.

Long Island—Given until January 1, 1931, to complete electrification. Evidence by the company showed that it has a definite program for complying with the law, requiring more than $3,000,000 during the present year and like amounts in the immediate future, the total estimated cost of construction and equipment being nearly $13,000,000.

Bush Terminal—This company, which operates piers and terminals on the Brooklyn water, was given an extension to January 1, 1931. The company proposes to install certain temporary overhead power construction to test the feasibility of handling cars from floats by means of electric locomotives. Expenditures estimated by this company total $400,000.

New York Dock Company.—Petition by this company, operating the Fulton, Baltic and Atlantic terminals in Brooklyn, was denied. More than 95 per cent of its business is interstate commerce.

Equipment and Supplies

Locomotives

THE ALASKA RAILROAD has ordered two Mikado type locomotives from the Baldwin Locomotive Works.

THE SEABOARD AIR LINE is now inquiring for 10 Mikado type and 25 six wheel switching locomotives. In the *Railway Age* of June 19 this company was reported as contemplating coming in the market for a number of locomotives.

Freight Cars

THE LOUISVILLE & NASHVILLE is inquiring for two flat cars of 75-tons' capacity.

THE CHICAGO SHORT LINE RAILWAY COMPANY is rebuilding in its own shops 20 gondola car bodies.

THE AMERICAN REFRIGERATOR TRANSIT COMPANY contemplates buying about 2,000 refrigerator cars.

THE CHESAPEAKE & OHIO has ordered 500 hopper bottom gondola car bodies from the Richmond Car Works. Inquiry for this equipment was reported in the *Railway Age* of July 17.

THE CHICAGO, ROCK ISLAND & PACIFIC has placed an order for 188 composite gondola car bodies of 50 tons' capacity and repairs to old trucks for same, with the Bettendorf Company.

Passenger Cars

THE NEW YORK, CHICAGO & ST. LOUIS is inquiring for one or two dining cars.

THE CHICAGO, MILWAUKEE & ST. PAUL is asking for prices for modernizing 10 observation cars and 2 buffet cars.

Iron and Steel

THE WABASH has ordered 1,700 tons of rail from the Illinois Steel Company.

THE SEABOARD AIR LINE has ordered 10,000 tons of rails from the United States Steel Corporation.

THE PENNSYLVANIA has ordered 2,000 tons of steel for bridges from the American Bridge Company.

THE CINCINNATI, INDIANAPOLIS & WESTERN has ordered 2,400 tons of rail from the Illinois Steel Company.

THE GULF, MOBILE & NORTHERN has ordered 10,000 tons of rail from the United States Steel Corporation.

THE ST. LOUIS-SAN FRANCISCO has ordered 12,000 tons of rails from the United States Steel Corporation.

THE ILLINOIS CENTRAL has ordered 625 tons of structural steel for a power house in Chicago from the American Bridge Company.

Machinery and Tools

THE GREAT NORTHERN has ordered one 40-ton electric traveling crane from the Whiting Corporation.

THE LOUISVILLE & NASHVILLE has ordered an 18-in. engine lathe from Manning, Maxwell & Moore, Inc.

THE BOSTON & MAINE has ordered one 32-in. heavy duty shear from Manning, Maxwell & Moore, Inc.

THE MISSOURI PACIFIC has ordered one 15-ton Shaw gantry crane from Manning, Maxwell & Moore, Inc.

THE ANN ARBOR RAILROAD has ordered one 2-in. double-head bolt cutter from Manning, Maxwell & Moore, Inc.

THE NORFOLK-SOUTHERN has ordered a Ryerson-Conradson 5-ft. radial drill from Joseph T. Ryerson & Son, Inc.

THE MAINE CENTRAL has ordered one 10-ton Shaw overhead electric traveling crane from Manning, Maxwell & Moore, Inc.

THE READING COMPANY has ordered a 90-in. journal turning lathe and a 48-in. car wheel borer from the Niles-Bement-Pond Company.

THE NORTHERN PACIFIC has ordered two 30-in. by 18-ft. engine lathes and one double axle lathe from Manning, Maxwell & Moore, Inc.

THE ILLINOIS CENTRAL has ordered a 48-in. car wheel borer and two combination journal turning and axle lathes from the Niles-Bement-Pond Company.

THE NEW YORK, NEW HAVEN & HARTFORD has ordered a 30-in. by 30-in. by 8-ft. planer and a 36-in. by 16-ft. lathe from the Niles-Bement-Pond Company.

THE CHICAGO & NORTH WESTERN has ordered a 42-in. by 42-in. by 10-ft. planer and a 10-ft. by 5/8-in. plate bending roll from Joseph T. Ryerson & Son, Inc.

Signaling

THE NEW YORK CENTRAL has placed an order with the General Railway Signal Company for 130 type K, size one, transformers for shipments to Alabama, N. Y.

THE NEW YORK, CHICAGO & ST. LOUIS has placed orders with the Union Switch & Signal Company for electro-mechanical interlocking equipment required for the installation of a plant at North East, Pa., involving an 8-lever mechanical frame machine with S-8 electric lever units, color light signals, etc. The field work will be carried out by the railroad company's construction forces.

THE CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA has placed an order with the General Railway Signal Company for one 4-way table interlocker for shipment to Eau Claire, Wis. Included in the order are also 8 Model 9A relays. This company has also placed an additional order with the General Railway Signal Company for one 4-way table interlocker and 8 Model 9A relays for shipment to Black River Falls, Wis.

THE CHICAGO & ALTON has placed an order with the General Railway Signal Company covering materials required on account of automatic train control installation between Pontiac and Mazonia, Ill. This order includes thirteen 1-arm Model 2A, upper quadrant 3-position ground signals, five upper quadrant dwarf signals, two clockwork time releases, six Model 9A d.c. tower indicators, two forced drop electric locks, 148 Model 9E d.c. neutral relays.

THE NEW YORK, NEW HAVEN & HARTFORD has placed orders with the General Railway Signal Company for four 2-arm vertical light upper left-hand quadrant Model 2A, 110-volt, 60 cycle ground signals, four one-arm upper left-hand quadrant Model 2A, 110-volt, 60 cycle bridge signals, two Model 2A, 110-volt, 60 cycle single phase upper left-hand quadrant signal mechanisms and two 2-arm staggered light upper left-hand quadrant, 110-volt, 60 cycle Model 2A signals. Above materials are for shipment to New Haven, Conn.

THE NEW YORK, CHICAGO & ST. LOUIS has contracted with the Union Switch & Signal Company for the materials and labor required for the installation of automatic block signaling on 170 miles of its railroad from Conneaut, Ohio, to Arcadia, Ohio, of which 49 miles is single track and 121 miles double track. The work involves a total of 277 style R-2 signals, 2 style T-2 signals, one position light dwarf signal, 1,288 relays and other necessary materials. The A. P. B. system will be used on the single track and neutral line control on the double track. The signals will be operated by the trickle-charge system; 440 volts, 60 cycle, single phase will be used on the transmission line. The signals will be electrically lighted from 10-volt a.c. energy, while the rest of the apparatus will be operated by direct current.

Supply Trade News

The Sullivan Machinery Company has moved its Boston, Mass., office from 201 Devonshire street to 45 Milk street.

The Railroad Supply Company has opened a sales office in room 414, Realty building, Savannah, Ga., with **J. C. Duranceau** in charge.

The Safety Car Heating & Lighting Company will remove its New York City office, about July 31, from 2 Rector street to 75 West street.

Wm. M. Neckerman has been appointed assistant to the vice-president of the **Youngstown Sheet & Tube Company,** Youngstown, Ohio.

W. J. Hammond, assistant traffic manager of the **Inland Steel Company,** Chicago, has been promoted to traffic manager, with the same headquarters.

The Trumbull Steel Company, Warren, Ohio, has opened a district sales office at 803 Union Trust building, Cincinnati, Ohio, for southern Ohio and Indiana and all of Kentucky, in charge of **Willard Foster.**

M. G. Henderson, formerly in charge of the Cleveland territory of **A. M. Byers Company,** has been appointed district sales manager in charge of the Chicago territory, to succeed E. A. Small, Jr., resigned.

The Kuhlman Electric Company, Bay City, Mich., manufacturers of power, distribution and street lighting transformers, has established a factory office at 3-260 General Motors building, Detroit, Mich. **Richard P. Johnson** is in charge of this office.

The automotive car division of the **J. G. Brill Company,** Philadelphia, Pa., builders of gasoline and gas-electric cars for short and branch line steam railroads, as well as for local service on main lines, has opened a new office in the Railway Exchange building, Chicago. **A. F. McCormick,** western sales agent, now has his office at this new location in Chicago.

R. A. Stoner, power apparatus specialist of the **Graybar Electric Company** at Philadelphia, Pa., has been appointed head of the company's local sales office at 718 Connell building, Scranton, to succeed E. D. Frisbie, deceased. **A. B. Vandercook** has been appointed assistant manager and **H. T. Simmons,** sales manager of the Los Angeles, Cal., distributing house of the company.

The Harnischfeger Corporation, Milwaukee, Wis., has appointed **H. S. Beale** as sales engineer in New York territory, and **H. A. Wolcott,** formerly in charge of the Miami office, has been made district manager of the New York territory, both with headquarters at 50 Church street, New York; **S. B. Bubier** has been appointed sales engineer in charge of the Miami district, with office at 343 S. W. River Drive, Miami, Fla.

Frans H. C. Coppus has resigned as president and treasurer of the Coppus Engineering Corporation, Worcester, Mass., in order to devote most of his time to railway equipment under the firm name of **Coppus Locomotive Equipment Company,** Worcester, Mass. The Coppus Engineering Corporation has assigned to Mr. Coppus its rights and interests pertaining to this line. Mr. Coppus will be identified with the Coppus Engineering Corporation in a consulting capacity and as chairman of the board, retaining also his financial interest in the corporation. **Otto Wechsberg,** formerly general manager, is now president and general manager, and **Jerome R. George, Jr.,** is treasurer of the Coppus Engineering Corporation.

J. N. Mahoney has been appointed manager of engineering, **American Brown Boveri Electric Corporation,** 165 Broadway.

New York. In this capacity the organization and details of operation of the entire engineering staff come under his jurisdiction. His capacity is executive while that of the chief engineer is consulting. From 1895 to 1898 Mr. Mahoney was employed by the Electric Storage Supply Company, Boston, Mass., and the Electro-Chemical Storage Battery Company of New York, in charge of design and manufacture of storage batteries and auxiliaries. From 1898 to 1901, he was employed by the New York & Queens County Railway Company and Electric Illuminating & Power Company of New York. In 1901, he served as engineer on electric railway brake equipment with the New York Air Brake Company, and in 1903, was appointed chief engineer of the American Electric Brake Company of New York. From 1906 to 1918, he was employed by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., consecutively as engineer in charge of electric railway control equipment; mining locomotive equipment; switch, fuse and circuit breaker equipment; general engineer on control. From 1918 to 1926, Mr. Mahoney was employed by the Sperry Gyroscope Company, Brooklyn, N. Y., as manager of engineers, sales manager and consulting engineer. During the time he was employed by the Sperry Gyroscope Company, he was also retained from 1920 to 1925 by the Condit Electrical Manufacturing Company, Boston, Mass., as consulting engineer on oil circuit breakers and switching equipment.

American Locomotive Semi-Annual Report

The American Locomotive Company in its condensed income account for the six months ended June 30, 1926, shows net earnings available for dividends of $3,338,289 as compared with $212,718 in the first six months of 1925 and $2,883,185 in the first half of 1924. After the allowance for dividends there was a deficit of $149,158.

The condensed income account for the six months ended June 30, 1926, includes the financial results from the operations of the Railway Steel-Spring Company from May 14, when such business was acquired by the Locomotive Company, to June 30, 1926.

There was expended for additions and betterments to the plants of the company during the six months period $271,240.54.

During the six months there were paid two regular quarterly dividends of $1.75 each per share on the preferred stock, the dividend on the preferred stock issued during the second quarter in connection with the reorganization plan being accrued from the date of issue to June 30. There was also paid on the common stock a dividend of $2.00 per share on 500,000 shares in the first quarter and a dividend of $2.00 per share on 770,000 shares in the second quarter.

The excess of current assets over current liabilities on June 30, 1926, was $52,085,304. The company had no loans payable and had in its treasury $33,335,544 in cash and marketable securities of which $17,501,891 was in the United States Government obligations, $6,178,622 in railroad equipment trust certificates, $3,547,762 in bonds and notes of the Canadian Government and $5,971,269 in cash on hand and in banks.

President F. F. Fitzpatrick says in connection with the report that "The amount of new business received during the six months period, although moderate in volume, was substantially better than that received during the same period in 1925. During the past several years the purchases of locomotives by the railroads have been below normal, and it is only reasonable to expect more active buying in the near future. The outlook is promising for the last half of the year and for the year as a whole."

Obituary

Charles T. Wilson, traveling representative for William Sellers & Co., Inc., Philadelphia, Pa., died at his home in Haddonfield, N. J., on July 18, at the age of 65.

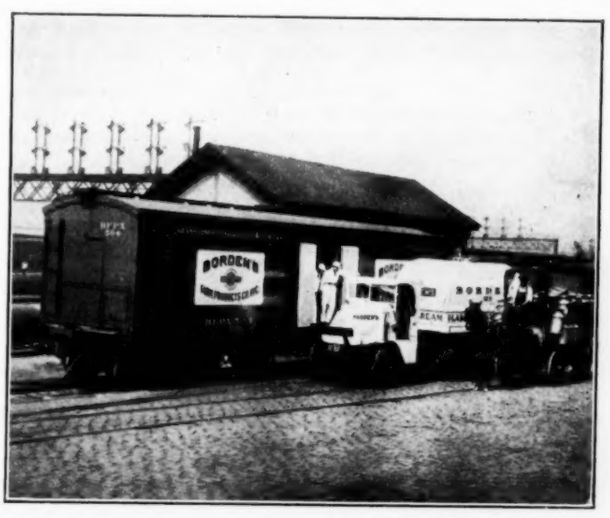
Franklin S. Terry of Cleveland, Ohio, vice-president of the General Electric Company and for years a leader in the incandescent lamp business, died suddenly of heart failure at his summer home at Black Mountain, near Asheville, N. C., on July 23, at the age of 64.

Colonel Washington A. Roebling, president of the John A. Roebling's Sons Company, died on July 21 at his home in Trenton, N. Y., at the age of 89. Colonel Roebling served in the Civil War. He was engaged, with his father, John A. Rockbling, in building the suspension bridge over the Allegheny river at Pittsburgh and the Cincinnati and Covington suspension bridge. With his brother, Charles G. Roebling, he successfully carried out the work of completing the Brooklyn bridge, the construction of which devolved upon them after the death of their father in July, 1869.

Robert T. Lincoln, president of the Pullman Company from 1899 to May 18, 1911, and the only surviving son of President Abraham Lincoln, died on July 26 at Manchester, Vt. He was born on August 1, 1843, in Springfield, Ill., and attended Harvard University until 1864, when he left school to enter the army as a captain and a member of General Grant's staff. He later practiced law and was called to Washington by President Garfield in 1881 to be Secretary of War. After four years he returned to his profession of law. In 1889 he was appointed United States minister to Great Britain by President Harrison, which position he held until 1893, when he returned to the practice of law at Chicago. On November 11, 1897, he was appointed acting president of the Pullman Company, and on October 19, 1899, was elected president. On May 18, 1911, he resigned because of ill health and was appointed chairman of the board, which position he held until January 14, 1922.

Robert T. Lincoln

INSTALLATION of automatic signals has been started by the Southern on seventy-two miles of track between Meridian, Miss., and New Orleans, La., which, when completed, will give the road continuous automatic signal protection on the line between Cincinnati and New Orleans, 836 miles, and on the line between Washington and New Orleans, via Atlanta and Birmingham, 1,160 miles.



Glass Lined Tank Car in New York Milk Service in Hoboken, N. J., Yard of D. L. & W.

Railway Construction

ATLANTIC COAST LINE.—A contract has been awarded to the Ogle Construction Company, Chicago, for the construction of three 500-ton coaling stations at Montgomery, Ala., Albany, Ga., and Palatka, Fla. A contract has also been awarded to the Ogle Construction Company for the construction of a 300-ton reinforced concrete coaling station at Ocala, Fla., this project to include also the erection of an electrically operated cinder plant.

BALTIMORE & OHIO.—This company has awarded the following contracts in connection with the construction of its perishables terminal at Philadelphia: Drainage and plumbing, $30,000, to August Mathan, Baltimore; fire protection, $29,000, to Boon & Sample, Inc., Philadelphia; heating $23,000, to the Baltimore Heat Corporation, Baltimore.

CANADIAN NATIONAL.—Plans are being prepared for the construction of a passenger station at Kamloops, B. C. Bids for the work will soon be requested.

CHICAGO GREAT WESTERN.—Plans have been prepared for the construction of a one-story enginehouse at Chicago estimated to cost $12,000.

CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA.—A contract has been awarded to J. E. Donlin, St. Paul, Minn., for the construction of an extension to the roundhouse at Sioux City, Ia., estimated to cost $38,000.

DULUTH, SOUTH SHORE & ATLANTIC.—According to press reports, plans are being prepared for the construction of an enginehouse and repair facilities and coal docks as Nestoria, Mich.

ILLINOIS CENTRAL.—A public hearing on this road's plans for the construction of a bridge across the proposed new channel of the south branch of the Chicago river in Chicago, was held in that city on July 23. The plans for a proposed bridge of the Baltimore & Ohio in the same vicinity were also considered, the hearing being held before the United States engineer at Chicago.

MISSOURI PACIFIC.—Bids will soon be received for the construction of a one-story machine shop and an addition to the enginehouse at Nevada, Mo., estimated to cost a total of $130,000.

MISSOURI PACIFIC.—This company has applied to the Interstate Commerce Commission for authority to construct an extension of a branch line from a point near Nashville, Ark., 7.5 miles in a northerly direction.

MOBILE & OHIO.—A contract has been awarded to John Marsch, Inc., Chicago, for grade reduction work near Ava, Ill., on the Cairo-St. Louis division.

PENNSYLVANIA.—Plans are being prepared for the construction of a double-track bridge across the Wabash river at Terre Haute, Ind. This work is a part of the projected double tracking of the line between St. Louis, Mo., and Indianapolis, Ind.

PENNSYLVANIA.—This company has awarded contracts as follows:

Nature of work	Location	Probable cost	Contractor
Erection of superstructure and placing concrete slab on bridge	Columbus, O.	$20,000	Kelly-Atkinson Co., Chicago.
Construction of yard tracks at Bay Jct.	Sandusky, O.	28,000	Ferguson - Edmundson Co., Pittsburgh.
Foundations for new shop buildings	Shire Oaks, Pa.	31,000	W. F. Trimble & Sons Co., Pittsburgh.
Masonry for new bridge abutment	Newcomerstown, O.	50,000	Dravo Contracting Co., Pittsburgh.
Masonry for 3 subways in Sewickley and 2 in Edgeworth in connection with line change Glen Osborne to Shields.	Edgeworth and Sewickley, Pa.	110,000	W. F. Trimble & Sons Co., Pittsburgh.
Grading and masonry for grade separation (jointly with city, B. & O. and Erie)	Akron, O.	220,000	Stevens Constn. Co., Cleveland, O.

Railway Financial News

ARTEMUS-JELLICO.—*Acquisition of Line.*—The Interstate Commerce Commission has issued a certificate authorizing the Artemus-Jellico to acquire and operate a line extending from a connection with the Louisville & Nashville at Artemus, Ky., to Anchor, 12.9 miles. The line is to be acquired from J. A. McDermott, who bought the property at a receivership sale of the company formerly known as the Cumberland Railroad.

ATCHISON, TOPEKA & SANTA FE.—*Acquisition of Line.*—The Interstate Commerce Commission has approved the acquisition of control of the New Mexico Central by purchase of capital stock and by lease. The New Mexico Central extends from Santa Fe, N. Mex., to Torrance, 116 miles. The Santa Fe proposes to acquire the line from the Metropolitan Company (Inc.) by the payment of $700,000 in cash for the stock in the railroad held by that company. Commissioner Eastman dissented.

BOSTON & MAINE.—*Reorganization Plan Declared Operative. —Dividends Declared.*—The general readjustment committee at a meeting on July 27 voted to declare the reorganization plan operative, and the board of directors of the Boston & Maine, also at a meeting the same day, approved this action.

The board of directors of the Boston & Maine Railroad having considered the earnings for the six months from January 1 to June 30, 1926, declared out of such earnings the semi-annual dividend for that period on the first preferred stock of the company, payable August 12, 1926, to stockholders of record July 31, 1926, the amounts to be as follows:

Class A first preferred	$2.50
Class B first preferred	4.00
Class C first preferred	3.50
Class D first preferred	5.00
Class E first preferred	2.25

The Boston & Maine reported for the first six months of 1926 net income after all charges of $2,832,958, which compares with $905,767 in the first six months of 1925, an increase of $1,927,190.

Abandonment of Branch.—The Interstate Commerce Commission upon further consideration has revoked a certificate issued November 3, 1925, authorizing this company to abandon its Belmont branch in Belknap county, N. H. The commission believed that the reargument showed that the savings to the railroad were not as great as might have been expected and that the financial and other hardships which would be brought upon the town of Belmont and vicinity were not shown to be "outweighed by the savings to the applicant which would probably and reasonably occur."

The Interstate Commerce Commission has issued a certificate authorizing the Boston & Maine to abandon its Kennebunkport branch from Kennebunk, Me., to Kennebunkport, 4.5 miles. The line was built by the Kennebunk & Kennebunkport Railroad in 1883. It was operated under lease until 1919 and then acquired by the Boston & Maine. It was shown that the line was built primarily for summer travel, by far the larger proportion of which now moves by automobile. It was also shown that the line was operated at a loss and that transportation service would still be available because of an electric railway and good highways.

CHICAGO, BURLINGTON & QUINCY.—*Abandonment.*—The Interstate Commerce Commission has authorized the abandonment of the line from Guernsey to Ironton, Wyo., 9.74 miles.

CHESAPEAKE & OHIO.—*Investigation of Purchase of Stock of Greenbrier & Eastern Ordered.*—The Interstate Commerce Commission has ordered an investigation of the purchase by the Union Trust Company of Cleveland of all of the outstanding stock of the Greenbrier & Eastern, an 11-mile road in West Virginia, stating that the purchase was made for and on account of the Chesapeake & Ohio, which provided the funds, and that the acquisition of the stock by the Chesapeake & Ohio has not been approved or authorized by the commission. It is stated that the investigation is for the purpose of inquiring regarding the purchase of the stock, the price paid and any matters connected therewith or related thereto. During the hearing on the

Nickel Plate merger last summer it was testified that O. P. Van Sweringen, as chairman of the C. & O., had asked the bank, by authority of the board of directors, to purchase 8,000 shares of stock of the Greenbrier & Eastern at $125 a share from A. B. Crichton, of Johnstown, Pa., president of the company.

CHICAGO, MILWAUKEE & ST. PAUL.—*Foreclosure Sale.*—A formal motion asking that the date of sale and upset price be set on the properties of this company pursuant to the foreclosure decree, was made by the Guaranty Trust Company and the United States Trust Company, trustees under the defaulted bonds of the railroad, on July 26, in Judge Wilkerson's court at Chicago. Counsel for these companies asked that the sale be set at an early date and that the upset price be fixed at $90,000,000, which would include $40,000,000 on the property secured by the Puget Sound bonds and $50,000,000 on the property secured under the general refunding mortgage bonds. Kuhn, Loeb & Co., and the National City Bank offered a formal suggestion that $100,000,000 be set by the court as the minimum price to be accepted for the properties, and that the sale take place on October 1.

CHICAGO, MILWAUKEE & ST. PAUL.—*I. C. C. Investigation.*—Mark W. Potter, one of the receivers of the Chicago, Milwaukee & St. Paul and formerly a member of the Interstate Commerce Commission, was a witness at the resumption of the hearings before Commissioner Frederick I. Cox in the investigation of the St. Paul's affairs on July 27. The hearing lasted one day and was held in the assembly room of the Merchants Association in the Woolworth building, New York.

Mr. Potter referred to the low rate level in western trunk line territory north of Kansas City and east of the Rocky Mountains. He termed the Puget Sound extension of the St. Paul a "burden" at this time; declared the railroad's equipment had been out of date since 1916 and was now in a "terrible condition," with its locomotives too light, and said there was a deplorable lack of repair shops and repair facilities, and that wooden cars in use should be out of service.

He attributed to automobiles and motor buses a heavy loss of revenue by the St. Paul and other railroads, and went so far as to declare that the tendency to go south indicated to him that "we are breeding a race of weaklings who are unwilling and will later be unable to stand the rigors of northern winters." He said it would require the large expenditure of money to put the St. Paul on its feet again, and that he saw "no way out" except through a readjustment of the road's financial structure.

"There is an opportunity for co-operation and co-ordination among all railroads, and particularly those of the Northwest," Mr. Potter said. "There would be a vast improvement in the Northwest if all roads were operated under one management. The day has gone by when one railroad must be operated at a loss in order that another may make money."

Discussing the burden the St. Paul was carrying in the operation of the Puget Sound extension, Mr. Potter traced the history of this extension and pointed out that for several years after it was built in 1909 it made money. Since the completion of the Panama Canal, however, it has not paid, he said, and while it is still a good investment to the bondholder, in his opinion, it has not paid any money to the stockholder.

Mr. Potter was interrogated by Assistant United States Attorney Dan H. Grady, representing the interests of Wisconsin, relative to his appointment as a receiver and any possible connection between it and his resignation from the Interstate Commerce Commission. Mr. Potter became quite angry at the line of questioning and was finally sustained by Commissioner Cox in his refusal to be questioned concerning any possible relationship.

Mr. Potter testified that the St. Paul faced a requirement of $32,000,000 a year and earned $18,000,000 as of 1924. He told of various things which, he said, had hurt the road's revenue, including rates, a general depression, wage increases, etc. He said that the pressure of business interests for low rates was strong.

"If the traffic manager of a railroad called a meeting to correct this his road would be blacklisted and boycotted," he declared. "I doubt if any traffic manager is reckless enough to do this. Only by all the carriers and the Interstate Commerce Commission working together could a remedy be worked out, and even then they might go to jail for violation of the Sherman act."

He also added, "When the company has to bear the burden and the cares of the farmer and the shipper it does not seem as if there were any way out for the railroads." Mr. Potter favored the acquisition by the St. Paul of the Gary and Terre Haute lines as "good buys."

Mr. Potter was followed by Philip J. Roosevelt, of Roosevelt & Son, New York, representing the Northwestern Railroad Security Holders Committee for a Fair Return. He said that the committee represented more than $240,000,000 par value securities owned by 1,350 individuals and corporations. Mr. Roosevelt read a long statement in which he gave eight reasons for the St. Paul difficulties. The reasons were:

Loss of freight traffic through its diversion to the Panama Canal route; unprofitableness of the Puget Sound extension; cost of electrification of certain mileage constituting a burden in interest for carrying charges not fully compensated for by savings in operating costs; drain upon system net revenues, resulting in the acquisition and operation of the Chicago, Milwaukee & Gary and the Chicago, Terre Haute & Southeastern properties; overcapitalization, bad financial structure and bad financing; physical condition of the property; inefficient operation and management, and unduly low freight rates.

In conclusion he said, "I request you in rendering your report upon the case of the St. Paul failure to make the following finding of facts:

"That the greatest receivership in history was primarily due to the failure of the railroad managements in the Northwest to initiate rates which would eliminate proved discriminations against the properties which they represent. That the primary cause of the failure of the St. Paul is the lack of an adequate rate structure; that it is the right and duty of the management of the property, in conjunction with the managements of other railroads in the northwest, and especially in western trunk line territory, promptly to initiate a thorough-going examination and revision of the rate structure in the northwest."

Mr. Roosevelt was not cross-examined. The hearing was adjourned without definite date.

DETROIT, TOLEDO & IRONTON.—*Tentative Valuation.*—The Interstate Commerce Commission's tentative valuation report places the final value for rate-making purposes at $11,826,300 for the common-carrier property owned and used as of 1918. The outstanding capitalization as of valuation date was $22,247,414 and the investment in road and equipment, as stated in the company's books, was $22,703,151, which the report says should be readjusted to $22,613,151. The cost of reproduction new was reported as $12,601,747 and the cost of reproduction less depreciation as $8,999,143.

EASTERN KENTUCKY.—*Abandonment.*—The Interstate Commerce Commission has issued a certificate authorizing this company to abandon that portion of its line from Riverton, Greenup county, to Grayson, Carter county, Ky., 12.58 miles. The company also desired to abandon that portion of its line from Grayson to Webbville, Lawrence county, Ky., but this portion of the application was denied. The railroad claimed that the line has been operated at a loss and that it is now suffering from competition of an improved highway. In the case of the line between Grayson and Webbville, it was shown that abandonment of the line would leave several communities without direct railroad service, which would result in curtailing operations in a nearby oil field and result in inconvenience otherwise.

ERIE.—*Equipment Trust.*—This company has applied to the Interstate Commerce Commission for authority for an issue of $356,000 of 4½ per cent equipment trust certificates, to be used in the acquisition of 15 all-steel through-line passenger coaches.

GALVESTON, HARRISBURG & SAN ANTONIO.—*Tentative Valuation.*—The Interstate Commerce Commission has issued a tentative valuation report placing the final value for rate-making purposes of the carrier property owned at $49,305,300, as of 1918, and that of the property used at $54,517,450. The outstanding capitalization as of valuation date was $78,861,783 and the investment in road and equipment, as stated in the company's books, was $75,966,630, but the report says that readjustments required by the commission's accounting examination would reduce this to $72,394,260. The cost of reproduction new, ex-

clusive of land, was placed at $49,221,563 for the property owned and the cost of reproduction less depreciation at $38,053,004. The company owned 26,446 acres of carrier lands, which were given a present value of $7,729,691.

GALVESTON WHARF COMPANY.—*Bonds.*—The Interstate Commerce Commission has granted authority to this company to issue not more than $1,250,000 refunding mortgage 5½ per cent bonds, series A, to be sold at not less than 95 to Arthur Perry & Co., Boston, Mass. The proceeds will be used to rebuild piers 23 to 26, destroyed by fire last January, and for the construction of a new warehouse on pier 9, the proportion of the expenditure chargeable to capital account being estimated at $1,127,243.

KANSAS CITY SOUTHERN.—*Merger Plans.*—See article on another page of this issue entitled "Application for New Southwestern System Filed."

LOUISVILLE & NASHVILLE.—*Acquisition.*—This company has been authorized by the Interstate Commerce Commission to acquire control of the Cumberland & Manchester by purchase of stock and by lease.

NACOGDOCHES & SOUTHEASTERN.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon its line from Oil Springs, Tex., to La Cerda, 6 miles.

NEW ORLEANS, TEXAS & MEXICO.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to issue and sell to Kuhn, Loeb & Co., at 97½, $4,600,000 of first mortgage 5 per cent bonds, to reimburse the treasury.

NORTH AMERICAN CAR CORPORATION.—*Equipment Trust.*—Freeman & Co. have sold $700,000 five per cent North American Car equipment trust certificates, series of 1926, to be dated August 1, 1926, and payable in equal annual installments from August 1, 1928, to August 1, 1937, to be issued under the Philadelphia plan. The certificates are secured by 598 all-steel, 8,000-gal. tank cars, having a current aggregate value in excess of $932,000. Of these cars 300 are new and 298 are now in operation.

READING.—*Acquisition.*—The hearing on the application for authority to acquire control of the Lehigh & New England, before C. V. Burnside, assistant director of the Bureau of Finance of the Interstate Commerce Commission, has been postponed from July 28 to September 8.

SEABOARD AIR LINE.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to sell $8,000,000 of first and consolidated mortgage 6 per cent bonds to a syndicate formed by Dillon, Read & Co., and Ladenburg, Thalmann & Co., at not less than 93¼, with a provision that should the syndicate sell the bonds at a price above 95¾ the Seaboard shall be entitled to receive all amounts in excess of that figure.

SOUTHERN RAILWAY.—*Acquisition of Line.*—The Interstate Commerce Commission has issued a certificate authorizing this company to acquire a line extending from Parrish, Ala., to High Level, 6.4 miles. This line was formerly a part of the Ensley Southern, which was sold at a foreclosure sale on April 28, 1926, and the cost to the Southern Railway is $50,000.

UNION FREIGHT RAILROAD.—*Mortgage Notes.*—This company has been authorized by the Interstate Commerce Commission to extend the maturity date of a mortgage note for $60,000, for a period of three years from June 16, 1926, at five per cent.

WABASH.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority for an issue of $15,500,000 of refunding and general mortgage 5 per cent gold bonds, which have been sold, subject to the approval of the commission, to Kuhn, Loeb & Co., at 93. The proceeds are to be used to reimburse the treasury for capital expenditures in 1925 and 1926.

Northwestern Security Holders Press Case

The New York Security Holders Committee organized by Roosevelt & Son, which has been agitating the question of rate relief for the northwestern roads, has addressed to all who supported its efforts in the western advance rate case a letter reading in part as follows:

"The decision denies the application of the carriers, but takes a position regarding your special interests, which we regard as distinctly encouraging. It states 'in the northwestern region and in western trunk line territory the revenues of certain of the important carriers have not yielded 5.75 per cent upon any rate bases that can reasonably be adopted in advance of the final determination of present values for rate-making purposes. The least favorable conditions in the district, so far as carrier revenues are concerned, appear to exist in western trunk line territory.'

"The commission thus confirms our principal contentions, first, that the rate structure is inadequate; second, that it is unfair and discriminatory as between carriers in the northwestern region and the carriers in the rest of the western district, and further that the western trunk line territory is in the most serious condition.

"The commission is explicit upon the point of the failure of the railway executives to initiate higher rates:

"'It is the right and duty of the carriers to take the steps necessary to correct improper rate relations. As a matter of fact, the carriers in the northwestern region endorsed the proposal for a 5 per cent advance in the whole of the western territory and made no effort to rectify the conditions of inequality and discrimination in their own district, which the commission has now plainly pointed out.'

"We submit that your committee, in helping to secure this decision from the commission, has gained a step of considerable value to your interests. We feel justified in calling upon the railway executives of the northwestern region promptly to take the 'steps necessary to correct improper rate relations' in that territory.

"We are sending a letter to the executives, asking them to take such action, and we ask you personally to support us in that request by exerting, to that end, such influences as you may be able to exert by letter or by personal interview."

Valuation Reports

The Interstate Commerce Commission has issued final or tentative valuation reports finding final value for rate-making purposes of the property owned and used for common-carrier purposes to be as follows, as of the respective valuation dates:

FINAL REPORTS

De Kalb & Western	$192,000	1917
Augusta	31,436	1918
Virginia-Carolina	1,912,415	1918
Big Sandy & Cumberland	63,785	1917

TENTATIVE REPORTS

Lake Superior Terminal & Transfer	$710,000	1917
Galveston, Harrisburg & San Antonio	$49,305,300	1918
Detroit, Toledo & Ironton	11,826,300	1918
Natchez, Urania & Ruston	31,500	1919
Duluth, Winnipeg & Pacific	4,225,136	1919
Waycross & Southern	188,900	1918

Dividends Declared

Boston & Maine.—First preferred, semi-annually: Class A, $2.50; B, $4.00; C, $3.50; D, $5.00; E, $2.25; all payable August 12 to holders of record July 31.

Connecticut & Passumpsic Rivers.—3 per cent, payable August 1 to holders of record July 1.

Massawippi Valley.—3 per cent, payable August 1 to holders of record July 1.

Average Price of Stocks and Bonds

	July 27	Last Week	Last Year
Average price of 20 representative railway stocks	95.84	96.36	83.02
Average price of 20 representative railway bonds	96.56	96.67	90.54

One of a Pair of 2-10-2 Type Engine Bed Frames Made in a Single 38,900-lb. Steel Casting for the Atchison, Topeka & Santa Fe by the Commonwealth Steel Company, St. Louis, Mo.

Annual Report

Thirty-Seventh Report of the Great Northern Railway Company

To The Stockholders:

The Board of Directors submits the following report for the year ended December 31, 1925.

Capital Stock

There has been no change during the year in the authorized share capital, same remaining at $250,000,000, of which there had been issued to December 31, 1925 ..... $249,550,650

There was held in the treasury $634,100 of this amount, the amount actually outstanding in the hands of the public being $248,916,550, a decrease of $560,600 during the year. This decrease is the net result of the return to the treasury of $633,000 held by the "Great Northern Employees' Investment Company, Limited," and an increase of $72,400 fully paid up and issued stock, subscribed for at par by residents of the territory to be served by the proposed extension west of Scobey, Montana.

The Interstate Commerce Commission by its order dated August 19, 1925, authorized the Company to issue not to exceed $300,000 of its preferred capital stock, to be sold for cash, at par, to persons interested in securing a line between Scobey, Montana, and Opheim, Montana, now under construction, the proceeds to be applied to the construction of this line. The entire issue was subscribed and underwritten by responsible parties. At the close of the year $72,400 had been fully paid up and certificates of stock had been issued therefor.

Funded Debt

The balance sheet shows amounts of bonds outstanding December 31, 1925. The figures compared with those of December 31, 1924, follow:

	1925	1924	Increase
Outstanding in hands of the Public	$318,866,515.16	$316,082,815.16	$2,783,700.00
Held in the Company's Treasury	25,005,000.00	25,005,000.00	.....
Held by Mortgage Trustees	51,145,393.93	51,145,393.93	.....
Totals	$395,016,909.09	$392,233,209.09	$2,783,700.00
Increase in amount of bonds outstanding in hands of the Public was due to the issue of 4½ per cent. Trust Certificates—Great Northern Railway Equipment Trust, Series "D," dated January 1, 1925	.....	.....	$4,250,000
Less			
The St. P., M. & M. Ry. Co. Consolidated Mortgage bonds redeemed through the operation of the Sinking Fund	$22,000	.....	
Notes maturing and paid during 1925, under the various equipment trust agreements	1,444,300	1,466,300	
Net increase			$2,783,700

Great Northern Railway Equipment Trust, Series "D"

This trust was created by agreement dated January 1, 1925, to which the Great Northern Equipment Company, The First National Bank of the City of New York, Trustee, and the Great Northern Railway Company are parties. Under the Trust $4,250,000 of 4½ per cent equipment trust certificates maturing in annual installments over a period of fifteen years have been issued, representing approximately 75 per cent of the cost of equipment leased by the Trustee to the railway company. The equipment under the trust consists of four locomotives, two thousand six hundred and twenty-five freight cars of various types, twenty oil tank cars, forty steel air dump cars, one steel spreader, and one 30-ton crane and ditcher. These certificates were sold for cash at 96.89 per cent and accrued interest.

Report of President

To the Board of Directors:

Summary of Operations for the Six Months Ended June 30, 1926

On January 26, 1926, a brief report was sent to each shareholder giving income statistics for the year 1925 and facts concerning the year's operation. Similar statistics for the first six months of 1926, 1925 and five-year average, 1921-1925, will show approximately the following:

	1926 (June Estimated)	1925	1921-1925 Five-Year Average
Revenue from freight transportation	$36,485,000	$35,734,558	$34,279,355
Revenue from passenger transportation	5,895,000	5,279,453	6,868,514
Revenue from mail, express, and other sources	4,695,000	4,826,295	4,791,261
Total railway operating revenues	$47,075,000	$46,840,306	$45,939,130
Railway operating expenses	35,905,000	35,683,864	38,401,006
Net revenue from railway operations	$11,170,000	$11,156,442	$7,538,124
Taxes	4,460,000	4,528,495	4,283,137
Equipment and joint facility rents (credit)	310,000	216,619	619,384
Net railway operating income	$7,020,000	$6,844,566	$3,874,871
Other income	*5,900,000	*5,389,263	5,489,146
Total income	$12,920,000	$12,233,829	$9,364,017
Interest and other deductions	†9,120,000	†9,182,473	8,552,088
Balance available for dividends	$3,800,000	$3,051,356	$811,929
Net railway operating income for twelve months	.....	$28,276,183	$21,470,494

*Includes $4,150,900 dividend from C. B. & Q. stock.
†Includes $4,025,000 interest on bonds issued for purchase of C. B. & Q. stock.

Present indications are that the earnings for the year 1926 will be somewhat better than they were for 1925.

Summary of Operating Income for the Years 1923, 1924 and 1925

Item	1925	1924	1923
Average mileage of road operated	8,242.09	8,251.44	8,254.21
Transportation revenue	$110,963,697	$107,486,902	$116,965,370
Incidental operating revenues	3,961,263	2,756,202	3,112,401
Total railway operating revenues	$114,924,960	$110,243,104	$120,077,771
Railway operating expenses	75,827,288	75,212,059	86,750,523
Net operating revenue	$39,097,672	$35,031,045	$33,327,248
Railway tax accruals	9,801,946	10,257,741	9,113,226
Uncollectible railway revenues	7,844	12,267	20,982
Railway operating income	$29,287,882	$24,761,037	$24,193,040
Equipment rents—net	Dr. 726,135	Dr. 304,269	Cr. 806,631
Joint facility rents—net	Dr. 285,564	Dr. 255,481	Dr. 267,679
Net railway operating income	$28,276,183	$24,201,287	$24,731,992
Ratio of expenses to revenues (per cent)	66.0	68.2	72.2

Freight Traffic

A synopsis of the tons of freight moved and revenue received for the years 1925 and 1924 is given below.

	1925		1924		Increase—I Decrease—D	
Commodity	Tons	Gross Revenue	Tons	Gross Revenue	Tons	Gross Revenue
Products of agriculture	5,863,719	$25,443,220	6,610,351	$28,621,715	D 746,632	D $3,178,495
Animals and products	601,555	4,539,880	526,012	3,851,517	I 75,543	I 688,363
Products of mines	19,344,117	18,986,609	17,803,622	18,217,017	I 1,540,495	I 769,592
Products of forests	4,028,387	15,545,354	3,500,672	13,624,004	I 527,715	I 1,921,350
Manufactures and miscellaneous	3,656,842	25,583,700	3,229,093	21,830,418	I 427,749	I 3,753,282
Total	33,494,620	$90,098,763	31,669,750	$86,144,671	I 1,824,870	I $3,954,092

[Advertisement]

There was no shortage or deficiency in car supply or service at any time during the year, and at all times the Company could have handled a much larger traffic without congestion or car shortage.

Passenger Traffic

The increased patronage of the long distance trains, particularly the Oriental Limited, has more than offset the loss in local passenger traffic. The large mountain type locomotives, which haul the heavy trans-continental trains, are able to start and stop them with perfect ease, and to maintain a uniform speed. This, together with the smooth roadbed and the cleanliness resulting from the use of oil instead of coal for fuel for more than twelve hundred miles west of Williston, North Dakota, makes the journey on these trains unusually attractive. Specially built and specially decorated coaches, in conformity with the furnishings of the Oriental Limited dining cars, sleeping cars and observation cars, have recently been put into service. These coaches are believed to be superior to any others now in service, and will still further increase the comfort and attractiveness of the train.

The use of automobiles in recent years has seriously reduced local railway passenger business in Great Northern territory, and especially in the State of Minnesota. The passengers carried and the passenger train miles run by the railways in that state each year, 1920 to 1925, have been as follows:

	Passengers Carried	Passenger Train Miles
1920	18,360,678	14,667,330
1921	13,372,072	14,588,131
1922	11,148,295	14,139,612
1923	10,434,122	14,460,723
1924	7,981,450	14,182,873
1925	7,130,571	13,835,789

As the Great Northern has 2,100 miles of line in Minnesota or nearly twice that of the next railway—the C. M. & St. P.—and nearly one-fourth the total in the State, its local passenger earnings have been more affected than those of any other carrier.

The Company is making extensive use of rail motor cars, a total of 22 having been put into service or purchased for local passenger runs. While the private automobile is mostly responsible for the decline in railway passenger travel, the highway bus has come into general use, and has been handling a large number of people. In some cases the patronage of the buses indicates a decided preference for that form of transportation; in other cases the traffic does not seem to justify so much duplication of service, especially considering the essential character of the railway passenger train. In order to meet the Company's obligation ot give the public adequate service, and also to protect the Company's rail operations, the Great Northern purchased several bus lines, and consolidated them into the Northland Transportation Company. This company now owns 140 buses. The law enacted in Minnesota in 1925 gives the State Railroad and Warehouse Commission authority over use of highways by commercial vehicles and makes it practicable for the first time in this state to provide a complete transportation system correlating the use of the railways with that of the highways. With proper attention and co-operation it is believed that a decided improvement and economy may be effected over the unregulated highway competition which previously existed.

Oil Development in Montana

There is a marked increase in this industry. The Kevin-Sunburst field, located on the Company's line, now has 396 producing wells with a weekly average of 54,000 barrels. Refineries located in Great Northern territory have an aggregate capacity of 18,000 barrels per day.

Oil from this field is used for locomotive fuel on the line from the western part of North Dakota to the Columbia Basin, the oil used between the Columbia Basin and Puget Sound being obtained from California fields.

Immigration and Agricultural Development

An intensive immigration and colonization campaign is being conducted by means of exhibits, farm journals, newspapers, and traveling representatives. With the aid and co-operation of experienced farmers, business men's clubs, and agricultural colleges, the development of diversified farming has been stimulated.

There is a substantial increase in the number of pure-bred dairy cattle, sheep and other livestock on farms in Great Northern territory.

The new beet sugar factories, at Sydney and Chinook, Montana, and Bellingham, Washington, manufactured 13,500 tons. The construction of a factory at East Grand Forks, Minnesota, will be completed in time for the 1926 crop. This industry is expanding and experienced sugar beet growers are settling in Great Northern territory.

The constant increase in the production of livestock, dairy products, poultry and eggs is reflected in the greater revenue received for the transportation of these commodities.

Maintenance of Track, Structures, and Equipment

The track and structures are in first class condition, the highest modern standards being followed. On account of the abundance of timber especially suited for ties, along the Great Northern line, preservative treatment of ties was not followed very extensively until recent years. Cost of ties, as well as cost of placing them, has increased so much that the practice is now justified. Accordingly, for the past three years treated ties have averaged 69 per cent of total ties placed. This increases the maintenance cost for the time being, but is an economy in the long run.

The maintenance of the property is carried out on a budget plan by which the forces are stabilized as much as possible. A distinctive feature of this plan, as applied to maintenance of equipment, is that improvements and betterments are made only as the locomotives, passenger cars or freight cars come to the shops for general repairs or overhauling. The road is adequately equipped in all respects; type of equipment owned is well adapted to the efficient and economical handling of the traffic and the physical condition of the equipment is excellent.

Change of Line and Electrification in Cascade Mountains

In order to eliminate heavy maintenance expense and reduce the cost of operating trains over the Cascade mountains, it was decided to construct a new line between Scenic and Berne, Washington, involving a single track tunnel 7.77 miles in length, on a 1.57 per cent maximum grade. This line change was authorized by the Board of Directors on November 19, 1925. The work is now fully organized, and excellent progress is being made, 6,196 lineal feet of tunnel having been driven up to June, 1926. It is expected that the new line will be in operation by the end of 1928.

The physical features of the old and new lines are as follows:

	Old Line	New Line	Favorable to New Line
Length	17.65 Miles	9.99 Miles	7.66 Miles
Total curvature	2147°	190°	1957°
Max. curvature	7600 Ft. of 10 C.	973 Ft. of 6° C.	10 curves, total length 6627 Ft.
Total Max. Grade (2.2%)	14.10 Miles	0.77 Miles	13.33 Miles
Summit elevation	3383 Ft.	2882 Ft.	501 Ft.
Total rise westward	546 Ft.	45 Ft.	501 Ft.
Total fall westward	1325 Ft.	824 Ft.	501 Ft.
Snow sheds, total length	6.04 Miles	0.00 Miles	6.04 Miles
Tunnels, total length	3.66 Miles	7.77 Miles	*4.11 Miles
Total snow sheds and tunnels	9.70 Miles	7.77 Miles	1.93 Miles
Bridges, total length	0.23 Miles	0.04 Miles	0.19 Miles

*Increase in length of tunnels on new line.

Since 1910 eastbound freight and passenger trains have been handled through Cascade Tunnel by means of electric locomotives, which have pulled the steam engine and train intact through the tunnel.

In addition, steam helper service has been required. In order to eliminate such helper service, the line between Skykomish and Cascade Tunnel, a distance of 24 miles, will be electrified. Contract has been made with the Puget Sound Power and Light Company for the necessary electrical energy to operate the line.

Work in Progress

Ore dock No. 1 at Allouez, Wisconsin, is being replaced with one of concrete and steel. The first one-third (124 pockets) was completed in time for the 1926 ore movement and the second one-third (124 pockets) will be completed in time for the 1927 ore movement.

Other projects under way are two line changes near Glacier Park Station, Montana, aggregating 11,829 lineal feet, which reduces the distance 2,594 feet, and eliminates 263 lineal feet of bridges, and five curves.

In addition, the usual relaying of track with heavy steel, and the improvement of terminals, buildings and bridges is being carried on.

Respectfully submitted,

RALPH BUDD, *President.*

[Advertisement]

Railway Officers

Financial, Legal and Accounting

R. P. Crutchfield, treasurer of the Union Railway, with headquarters at Memphis, Tenn., has been appointed auditor, with the same headquarters, succeeding **C. T. Pennebaker,** who has resigned to accept service with the Missouri Pacific at St. Louis, Mo. **W. C. Rapp,** secretary, with headquarters at Memphis, has been elected secretary and treasurer, and **O. F. Soderstrom** has been elected assistant treasurer, both with headquarters at Memphis.

Operating

H. H. Shepard, general superintendent of the Delaware, Lackawanna & Western, with headquarters at Scranton, Pa., has resigned to accept service elsewhere, effective August 1, and **E. B. Moffatt,** assistant to vice-president and general manager, with headquarters at New York, has succeeded him as general superintendent at Scranton. **A. E. Staub,** division superintendent at Buffalo, N. Y., has been appointed assistant to the vice-president and general manager at New York, succeeding Mr. Moffatt, effective August 1.

Charles A. Cotterell, who has been promoted to general superintendent of the British Columbia district of the Canadian Pacific, with headquarters at Vancouver, B. C., was born on January 18, 1876, and entered railway service in June, 1890, as a messenger on the Canadian Pacific. He was later employed as an operator and agent at various points, being promoted to train dispatcher on the Fort William division in January, 1901. He was later promoted to chief dispatcher, leaving the Canadian Pacific in September, 1906, to become a chief dispatcher on the Great Northern. Mr. Cotterell returned to the Canadian Pacific in May, 1908, as trainmaster and chief dispatcher on the Saskatoon division, and in January, 1909, was transferred to the Revelstoke division. He was later promoted to trainmaster and acting superintendent of the Nelson and Vancouver divisions, and was promoted to superintendent of the Vancouver division in May, 1913. He was transferred to the Lethbridge division in April, 1916, and was again transferred to the Medicine Hat division in March, 1918. Mr. Cotterell was promoted to assistant general superintendent of the British Columbia district in October of the same year, and held that position until his recent promotion to general superintendent.

C. A. Cotterell

E. S. Moore, superintendent of transportation of the Norfolk & Western, with headquarters at Roanoke, Va., has been promoted to general superintendent of transportation, with the same headquarters, succeeding D. E. Spangler, deceased. **J. R. Talbott,** superintendent of car service, with headquarters at Roanoke, Va., has succeeded Mr. Moore as superintendent of transportation . **J. D. Woodroof,** car accountant, has succeeded Mr. Talbott as superintendent of car service and **Joseph Zerbee,** chief clerk to the car accountant, has become car accountant, succeeding Mr. Woodroof.

Robert K. McClain, who has been appointed superintendent of the Asheville division of the Southern, with headquarters at Asheville, N. C., was born on August 10, 1887, at Gowansville, N. C., and was educated in graded school and in college. He entered railway service on April 1, 1900, with the Southern. From 1900 to 1902 he was a station hand, and from 1902 until 1906, Mr. McClain attended school. He was a telegraph operator from 1906 to 1907, and train dispatcher from the latter date until 1916. At this time he became trainmaster, and one year later was promoted to chief train dispatcher, which position he was holding at the time of his recent appointment as superintendent of the Asheville division of the Southern.

Traffic

C. W. Strain, who has been promoted to passenger traffic manager of the Missouri Pacific lines (Gulf Coast Lines and International-Great Northern), with headquarters at Houston, Tex., was born on February 13, 1874, at Otterville, Mo., and entered railway service in March, 1888, as an agent and operator on the Kansas City, Fort Scott & Memphis at Fort Scott, Kan. He was promoted to city passenger agent at Kansas City in 1892, and two years later was made traveling passenger agent in the southwestern territory, with headquarters at Dallas, Tex. When the Kansas City, Fort Scott & Memphis was merged with the St. Louis-San Francisco in 1898, Mr. Strain was appointed traveling passenger agent of the latter road, with headquarters at Dallas, and he was later promoted to division passenger agent at Wichita, Kan. In January, 1905, he was made general passenger agent, with headquarters at Fort Worth, and was transferred to Houston in 1912, his jurisdiction extending over the Gulf Coast Lines as well as the St. Louis-San Francisco. Subsequent to the receivership and reorganization of the Gulf Coast Lines in March, 1916, Mr. Strain was made general passenger agent of the Gulf Coast Lines, and he held that position until his recent promotion to passenger traffic manager of the Missouri Pacific lines.

C. W. Strain

W. C. Spencer has been appointed district passenger agent of the Southern, with headquarters at Philadelphia, Pa., and **C. W. Martin** has been appointed district passenger agent at Chattanooga, Tenn.

W. H. Downs, commercial agent of the Chicago & Eastern Illinois, with headquarters in Chicago, has been promoted to general agent, with headquarters at Houston, Tex., succeeding **Wallace Green,** who has resigned.

C. W. Murphy, general agent of the Lehigh Valley at Philadelphia, has been granted a leave of absence on account of ill health, and **C. W. Pfaff,** commercial agent, will be in charge of the office during his absence, effective August 1.

W. H. Snell, general passenger agent of the Canadian Pacific, with headquarters at Vancouver, B. C., has retired. **N. R. Des Brisay,** assistant general passenger agent, with headquarters at Winnipeg, Man., has been promoted to general passenger agent at Vancouver in place of Mr. Snell. **W. Horder,** assistant district passenger agent, with headquarters at Toronto, Ont., has been promoted to assistant general passenger agent at Winnipeg, succeeding Mr. Des Brisay.

E. T. Willcox, assistannt freight traffic manager of the Seaboard Air Line, with headquarters at Norfolk, Va., has been transferred to Birmingham, Ala. **J. H. Ketner,** general

freight agent at Norfolk, Va., has been appointed assistant freight traffic manager, with the same headquarters, with jurisdiction over all formal and informal complaints before the Interstate Commerce Commission and state commissions, refrigeration and other protective services and rates, rules and regulations involving fruit and vegetable traffic. **G. B. Rice**, assistant to the first vice-president, with headquarters at Norfolk, has been appointed assistant freight traffic manager, with the same headquarters, with jurisdiction over freight rates, rules and regulations involving other than fruit and vegetable traffic. **J. H. Toomer**, assistant general freight agent at Norfolk, has been appointed general freight agent, with the same headquarters. **T. L. Southwell**, assistant general freight agent at Tampa, Fla., has been appointed acting division freight and passenger agent, with headquarters at Tallahassee, Fla., and **R. W. Daniel**, assistant general freight agent at Birmingham, Ala., has been transferred in the same capacity to Tampa, Fla., succeeding Mr. Southwell.

Frank E. Scott, who has been promoted to assistant freight traffic manager of the Southern Pacific, with headquarters at Los Angeles, Cal., was born on April 21, 1888, at Glasgow, Scotland, and was educated in London, England. He entered railway service in November, 1908, as a clerk in the claim department of the Southern Pacific at San Francisco, Cal., later being employed as a clerk in the accounting department, secretary to the general freight agent, and secretary to the freight traffic manager. Mr. Scott was appointed clerk to the freight traffic manager in 1914, and two years later was made district freight and passenger agent, with headquarters at Salt Lake City, Utah. He returned to San Francisco in 1918 as chief clerk in the freight traffic department, remaining there until 1920, when he was promoted to general agent in charge of the off-line agency at Cincinnati, Ohio. In 1921 Mr. Scott was made assistant to the director of traffic, with headquarters at New York, and he held that position until 1923 when he was promoted to general freight agent, with headquarters at Los Angeles, Cal. He continued in that position until his recent appointment as assistant freight traffic manager.

F. E. Scott

Engineering, Maintenance of Way and Signaling

W. F. Zane, assistant signal engineer of the Chicago, Burlington & Quincy, lines west of the Missouri river, with headquarters at Lincoln, Neb., has been promoted to signal engineer of the system, with headquarters at Chicago, succeeding **J. B. Latimer**, who died on June 10. **E. G. Wesson** has been appointed assistant signal engineer, with headquarters at Lincoln, in place of Mr. Zane. **B. F. Lollis** has been appointed assistant signal engineer, lines east of the Missouri river, with headquarters at Chicago, a newly created position.

The position of general roadmaster on the Kansas City Southern and the Texarkana & Fort Smith at Texarkana, Tex., has been abolished, effective July 16. **G. T. Anderson**, who formerly occupied this position, has been appointed district roadmaster at Spiro, Okla., effective August 1. **W. G. Morgan**, formerly division engineer at Kansas City, has been appointed division engineer on the Kansas City Southern and chief engineer on the Texarkana & Fort Smith, at Texarkana, Tex., having jurisdiction over both roadway and engineering departments. **T. F. Quinn**, who was formerly chief engineer on the Texarkana & Fort Smith, and assistant engineer on the Kansas City Southern, has assumed the title of assistant engineer on both lines, with headquarters at Texarkana. **I. L. Hartzell** has succeeded Mr. Morgan at Kansas City and will have the title of acting division engineer. **A. M. Spyres**, formerly roadmaster at Spiro, Okla., has been transferred to district roadmaster at Shreveport, La., and **P. J. McCarthy**, district roadmaster at Shreveport, La., has been transferred to Kansas City as assistant engineer.

Obituary

Dr. James A. Denney, formerly chief surgeon of the Chicago, Burlington & Quincy, who retired in 1924, died in Santa Monica, Cal., on July 20.

William Stanton Rathbun, general assistant to the president of the New York, New Haven & Hartford, with headquarters at New York, died of heart disease on July 27 at his home in Norwich, Conn. Mr. Rathbun was for more than 40 years in railroad work, having entered that service as an office boy in 1883. He was born on May 7, 1866, at Mystic, Conn., and graduated from the Norwich Free Academy in 1883, in which year he entered the service of the Norwich & Worcester. He rose from office boy to chief clerk and assistant division freight agent of that company, which positions he held until 1923. From that time to 1909 he was clerk, traveling auditor and chief traveling auditor of the New York, New Haven & Hartford. From 1909 to 1920 he was local auditor of the same road at New York and from March 1, 1920, until the time of his death he was general assistant to the president, with offices in Grand Central Terminal.

D. E. Spangler, general superintendent of transportation of the Norfolk & Western, with headquarters at Roanoke, Va., died on July 22, at the Hotel Traymore in Atlantic City, where he was attending the Interstate Commerce Commission's hearing on soft coal freight rates to Lake Erie. Mr. Spangler was born on May 31, 1863, at Circleville, Ohio, and was educated at high school there. He entered railway service in August, 1879, as warehouseman and loading clerk on the Scioto Valley (now part of the Norfolk & Western), and until June 1, 1880, he held various clerical positions with the same road. From that date until February 11, 1882, he was telegraph operator, and from February 11, 1882, until August 1, 1883, was station agent. He then became train dispatcher, which position he held until November 1, 1891, when he became chief train dispatcher. He remained in this position until November 15, 1897, and then became trainmaster. On December 6, 1898, he was appointed car service agent, and superintendent of transportation on October 9, 1903, which position he held until July, 1917. From July 1, 1917, to June 1, 1918, Mr. Spangler was general superintendent of transportation. All this service was with the Norfolk & Western. From June 1, 1918, to February 29, 1920, he was regional transportation assistant of the Pocahontas region, United States Railroad Administration, at Roanoke, Va., and from March 1, 1920, until the time of his death he was general superintendent of transportation of the Norfolk & Western. From February 1, 1917, to February 15, 1918, Mr. Spangler was also a member of the Car Service Commission, and from July 1, 1920, until February 15, 1921, was a member of the Car Service Division, American Railway Association at Washington, D. C., on assignment from the Norfolk & Western.

D. E. Spangler